

2019 CORPORATE SOCIAL RESPONSIBILITY REPORT

株洲中车时代电气股份有限公司
ZHUZHOU CRRC TIMES ELECTRIC CO., LTD.

(A joint stock company incorporated in the People's Republic of China with limited liability)

Stock Code: 3898

NOTES

For better expression and reading, Zhuzhou CRRC Times Electric Co., Ltd. is represented as "CRRC Times Electric", "the Company" or "we" in this report.

The report is prepared with references to the Environmental, Social and Governance Reporting Guide set out in Appendix 27 to the Rules Governing the Listing of Securities on The Stock Exchange of Hong Kong Limited, Guideline on Sustainable Development Report of the Global Reporting Initiative (GRI), Guideline on Social Responsibilities of Industries (GSRI-China) and "the Ten Principles" of the UN Global Compact, and based on the actual situation of CRRC Times Electric.

Unless otherwise specified, the report covers the period from 1 January 2019 to 31 December 2019. The currency used herein is RMB. This report covers the Company's headquarters and share-holding subsidiaries but not including joint stock companies, and uses the same scope, boundary and calculation methods as the previous reports.

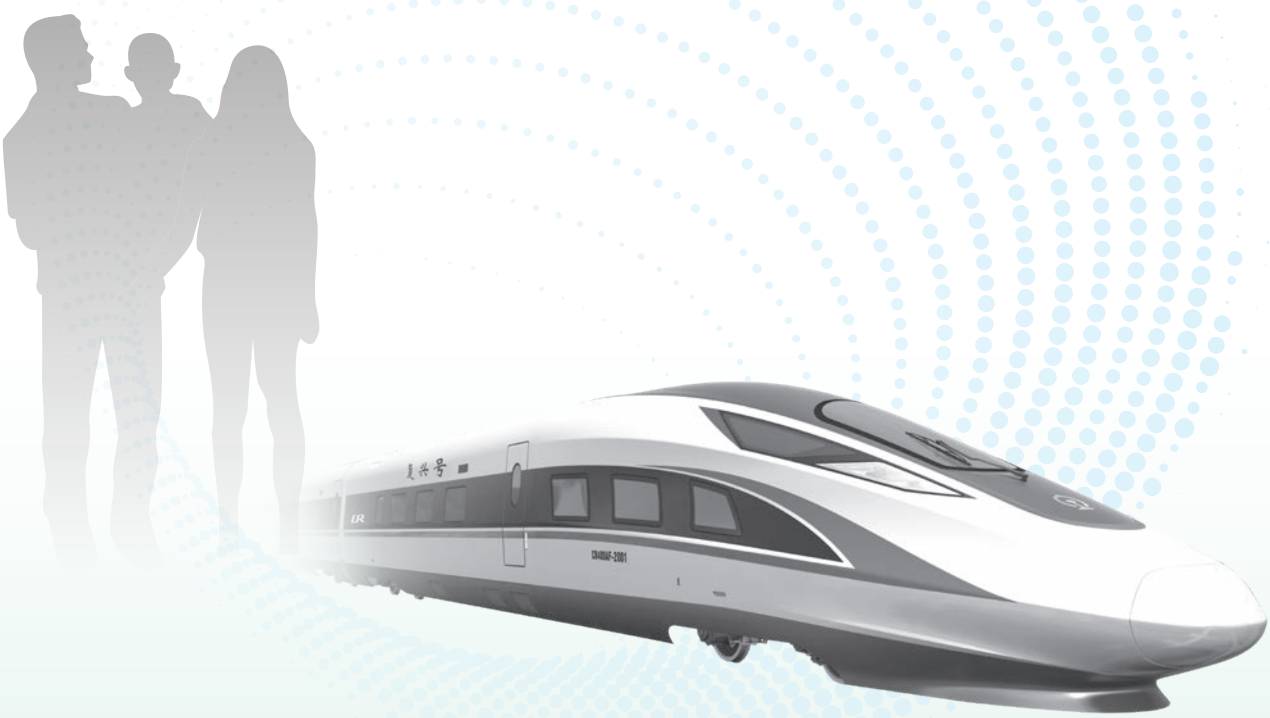
This report is a faithful reflection of the Company's active fulfillment of its economic, environmental and social responsibilities and its full implementation of the sustainable development strategy. It is a report of full disclosure of the Company's management performance related to stakeholders' concerns and expectations. All the information and data herein are collected from the Company's official documents, statistical reports and sustainable development practices of functional departments and subordinate units.

This report is published in both Chinese and English versions. If there are discrepancies between the two versions, the Chinese version shall prevail.

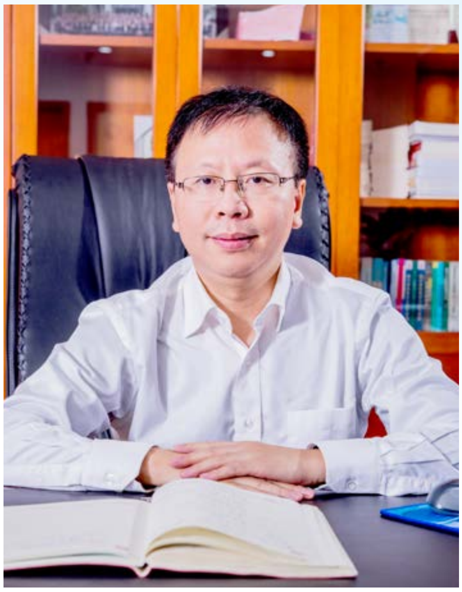
Address of the Headquarters: Shidai Road, Zhuzhou City, Hunan Province, China

Electronic Version Available at: www.tec.crrczic.cc

CONTENT



SPEECH BY THE GENERAL MANAGER



In 2019, global macro-environment experienced profound changes with increasing uncertainty and instability, the PRC economy maintained stable development with a favorable long-term trend, significant progress was made in tackling the three major problems, and high-quality development has become a national strategy. CRRC Times Electric adhered to its original mission, deeply implemented the groundbreaking "Three-Year Action Plan", continued to utilize the brand strength and platform advantages of CRRC, and strived to achieve the vision of "Becoming a global leading corporate group with multinational operation and developing rolling stock equipment as its core business".

Currently, the PRC is firmly implementing the "Belt and Road Initiative" and the Outline for Building China's Strength in Transportation in which infrastructure development continues to play an important role. Rail transportation industry is entering a stage of in-depth adjustment and transformation with intensifying homogeneous competition, which causes increasing pressure to enterprises in respect of high-quality operation. Under the new round of technology revolution, information communication, talent concentration and technology development accelerate, revolutionary technologies and models continue to emerge, and cross-sectoral innovation and competition have become the new normal. Facing the new competitive landscape, corresponding transformation is a must. The Company shall further enhance its awareness of crisis and innovation, continue to deepen reform, focus on technology research and development and strengthen the refined management. In general, the Company's industrial operation layout of "Three Core Businesses, Five Incremental Industries, One Strategy and Two Markets" is in line with the national strategy, and the core technology of conversion control with environmental and energy saving characteristics is well recognized by the market and users. Under the leadership of the board of directors (the "Board"), the Company has the foundation, ability and confidence to capture the development opportunities, thereby achieving collaborative and high-quality development through concentric diversification.

New situation brings new challenges, and new responsibilities require new actions. The Company will always uphold the operating philosophy of integrity and diligence, adhere to the development idea of "high-quality operation and highly efficient operation", and coordinate different elements and segments in the industrial chain to achieve asset and resource appreciation and sustainable development in all aspects. With a heart of gratitude, the Company will continue to actively assume its responsibilities, strive to maintain the balance among industrial development, environmental protection as well as social and business progress, and share the fruits of corporate growth with the country, society, shareholders, customers, employees and stakeholders.

Executive Director and General Manager of Zhuzhou CRRC Times Electric Co., Ltd.
Liu Ke'an

PART I COMPANY PROFILE AND GOVERNANCE

I. COMPANY PROFILE

1. Introduction

Zhuzhou CRRC Times Electric Co., Ltd. was established jointly by five units including CRRC Zhuzhou Institute Co., Ltd. ("CRRC ZELRI") in 2005. On 20 December 2006, the H Shares of CRRC Times Electric was successfully listed on The Stock Exchange of Hong Kong Limited (the "Hong Kong Stock Exchange", stock code: 03898 HK).

CRRC Times Electric is the backbone of the "golden card" of the PRC's high-speed rail, and is a domestic enterprise that possesses and applies proprietary core technologies on a mass scale. In order to achieve "higher reliability and safety, as well as higher efficiency and effectiveness", the Company adopts the rapid traction management model and adheres to the "concentric diversification" development strategy. Through continuous innovation, it possesses ten core technologies and expands to advantageous sectors. Focusing on technology and market, it has established a complete industrial chain comprising "basic parts + devices and systems + overall units and engineering" for various sectors, including high-speed rail, locomotives, urban rail transit, railway engineering machinery, signal and communication, high power semiconductor, sensor, marine engineering equipment, new energy vehicle, and industrial conversion, with the global presence in over 20 countries and regions.

With the purpose of "connecting the world to benefit human", CRRC Times Electric aspires to work with the community, in order to make outstanding contributions to the growth of China's high-end equipment industry.

2. The Main Economic Performance of the Company in 2019

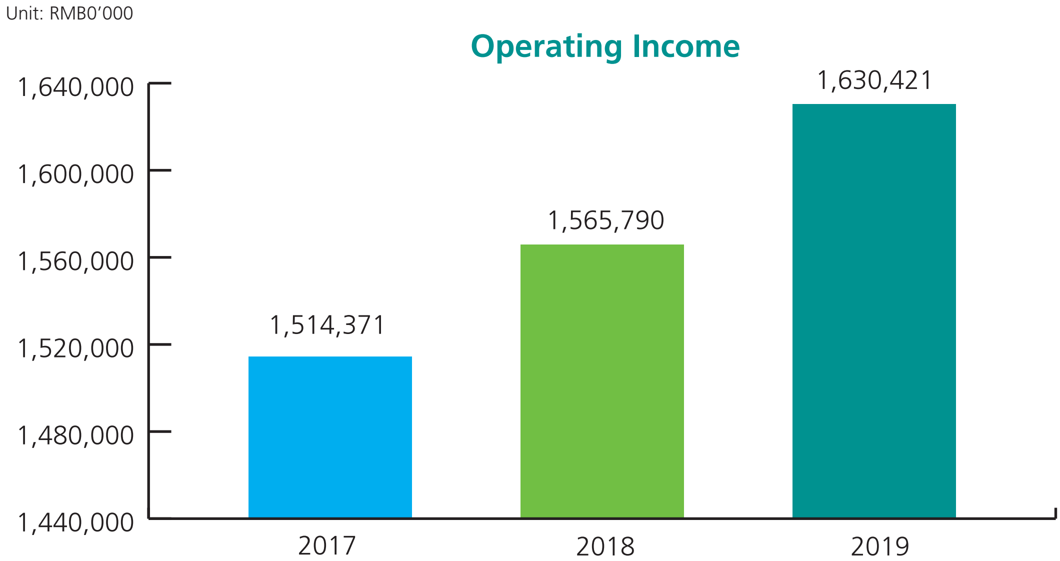
The Company's main business performance indicators saw improvement in 2019. Set out below are the business performance indicators:

Table of major business performance indicators

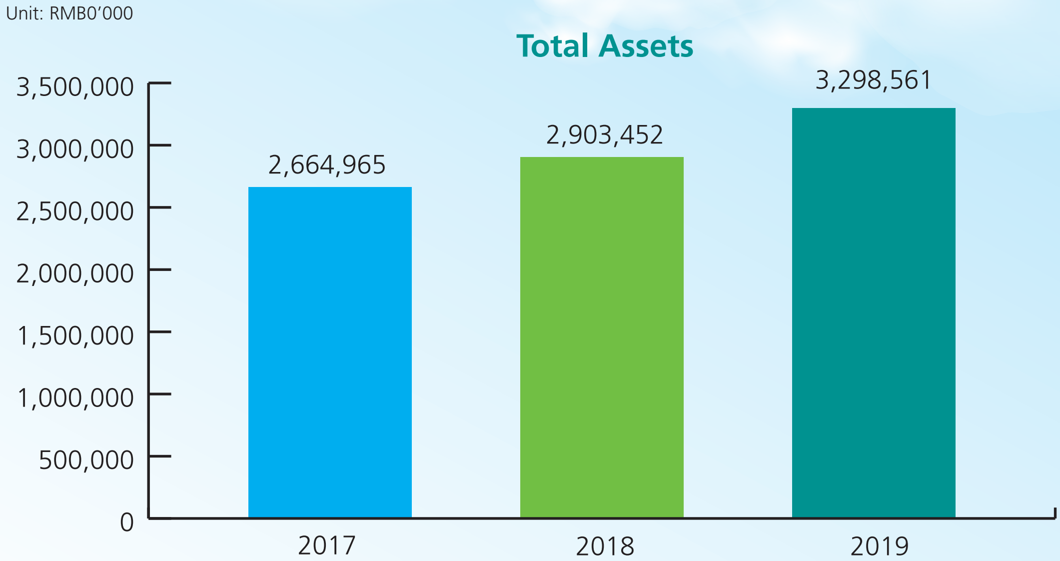
Unit: RMB ten thousand

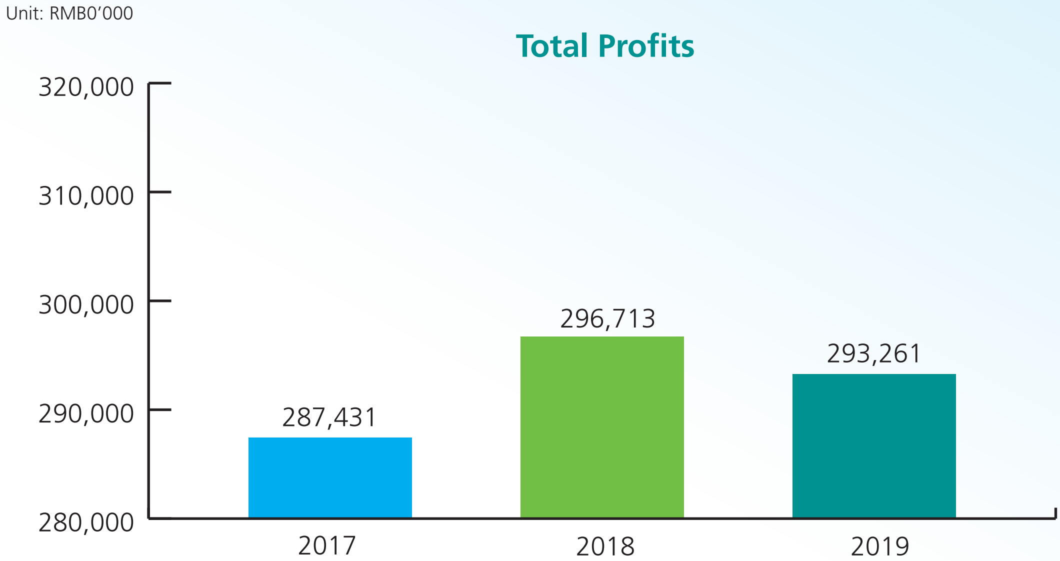
Indicator	2017	2018	**2019**
Operating income	1,514,371	1,565,790	**1,630,421**
Total assets	2,664,965	2,903,452	**3,298,561**
Total profits	287,431	296,713	**293,261**
Total tax payment	153,365	116,892	**151,422**
Operating costs	952,904	979,025	**996,573**
Revenue distribution	52,896	52,896	**52,896**

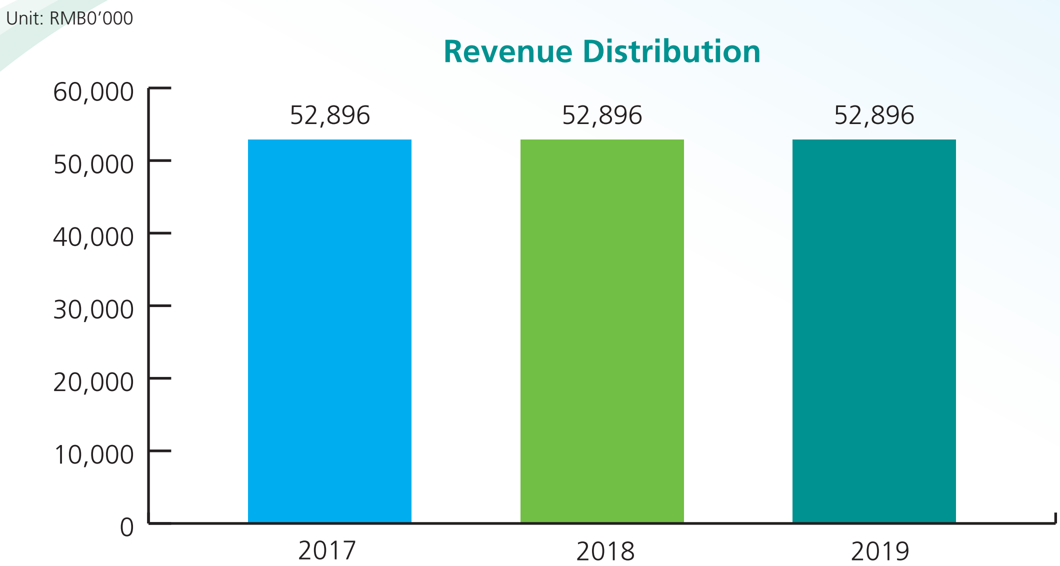
* Note: The revenue distribution in 2019 shall be subject to the approval of the general meeting of shareholders.



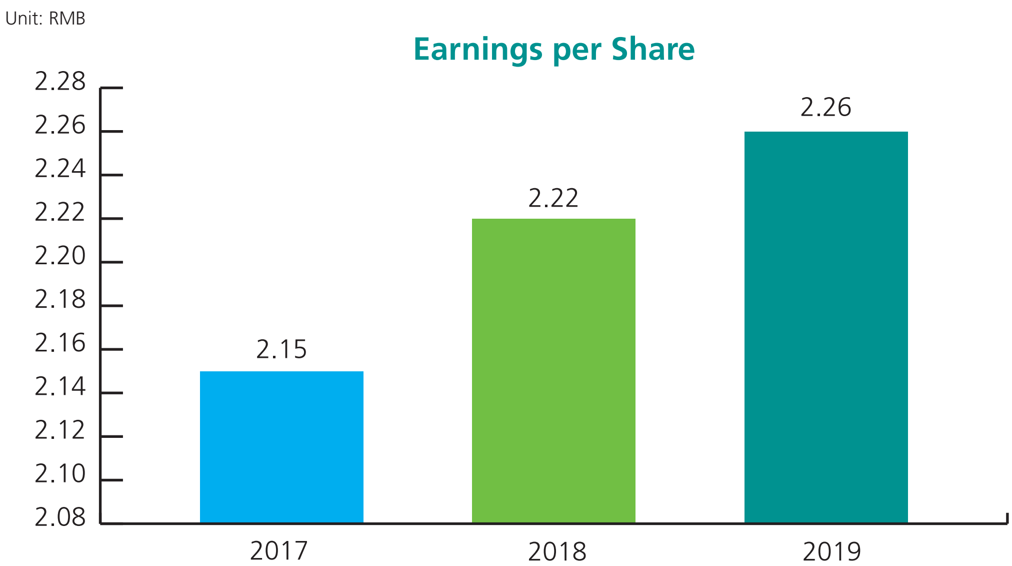
PART I COMPANY PROFILE AND GOVERNANCE







The earnings per share of the Company increased slightly in the past three years. From 2017 to 2019, it recorded earnings per share of RMB2.15, RMB2.22 and RMB2.26, respectively.



– Business performance of sub-product

In 2019, the Company achieved an operating income of RMB16.304 billion, including RMB9.001 billion from the business of railway equipment, RMB4.263 billion from the business of urban railway equipment, RMB2.936 billion from the business of new industry and RMB0.104 billion from other businesses.

PART I COMPANY PROFILE AND GOVERNANCE

Operating income from major products in the past three years is as follows:

Operating income from major products in previous years

(Unit: RMB million)

Indicators	2017	2018	**2019**
Business of railway equipment	9,159	9,085	**9,001**
Business of urban railway equipment	2,761	3,375	**4,263**
Business of new industry	2,902	3,118	**2,936**
Others	322	80	**104**
Total operating income	15,144	15,658	**16,304**

– Significant financial support from the government

From 2017 to 2019, the Company has undertaken various major scientific and technological projects of the state, the Ministry of Railways and Hunan Province. Total allocation from the government for scientific and technological projects amounted to RMB58.07 million, RMB123.13 million and RMB246.37 million in 2017, 2018 and 2019 respectively.

– Employees' total remuneration and classification

In 2019, the total remuneration of our employees was RMB2,199.63 million, including wages of RMB1,513.85 million, wage surcharges of RMB614.67 million and welfare expenses of RMB71.11 million.

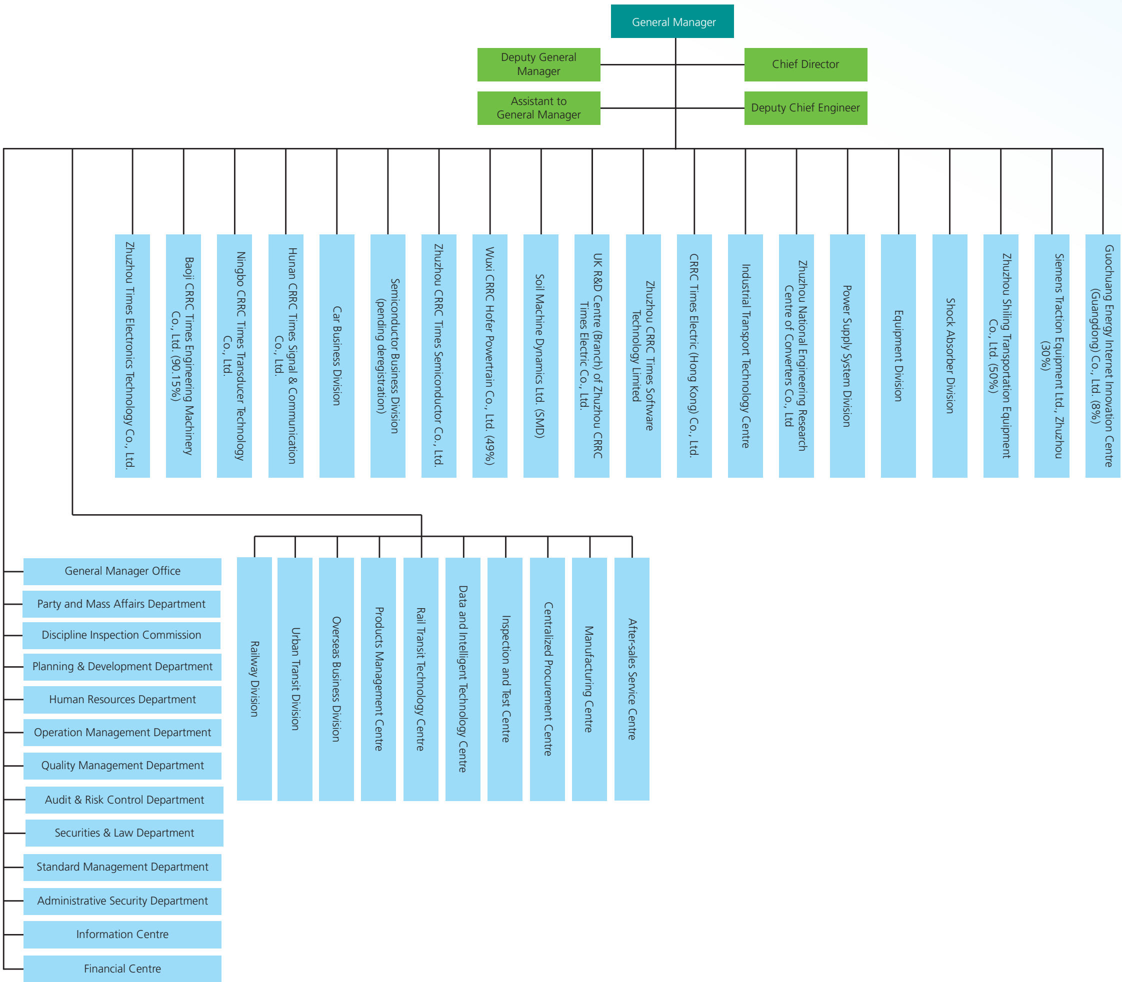
PART I COMPANY PROFILE AND GOVERNANCE

II. CORPORATE GOVERNANCE

1. Corporate Governance Mechanism

1.1 Corporate Organizational Structure

Organizational chart of CRRC Times Electric



1.2 Corporate Governance System

- *Board of Directors*

As at the date of this report, the Board is comprised of 10 directors, each with different industry backgrounds and expertise. The Board fully represents the interests of shareholders and is accountable to the general meeting. It formulates the Company's development strategy and monitors the implementation of management and finance within the terms of reference as required in the Articles of Association and in accordance with the procedures set out in the Rules of Procedures of the Board, and takes long-term performance and returns as its priority. Five specific committees, namely strategy committee, audit committee, risk management committee, nomination committee and remuneration committee are established under the Board.

The Company has 5 independent non-executive directors, representing half of the total number of directors. Independent non-executive directors focus on the improvement of corporate governance and major decisions of the Company, express fair and objective advice on major matters and related transactions of the Company, and employ scientific approaches in decision-making of the Board so as to safeguard the interests of the Company and minority shareholders.

The Company held 8 meetings of the Board in 2019.

- *Board of Supervisors*

As at the date of this report, the board of supervisors is comprised of 4 supervisors, including 1 independent supervisor, 1 shareholder representative supervisor and 2 staff representative supervisors. In particular, staff representative supervisors shall be recommended at the workers' congress and elected at the shareholders' general meeting. The board of supervisors exercises supervision rights independently according to the law to safeguard the legal rights and interests of shareholders, the Company and its employees.

The Company held 4 meetings of the board of supervisors in 2019.

- *The Management*

The senior management of the Company is responsible for executing strategic decisions of the Board and management of daily operations of the Company. Daily supervision and annual assessment of the management are performed by the Board. The positions of Chairman of the Board and General Manager of the Company are held by different individuals, for which the duties are clearly defined to ensure the independence of the Board's decision and daily management and operation. The Company sets up annual goals for the respective subordinate units by dividing its strategic objectives for different years and layers and establishes an objective-based evaluation system for senior management and managers of subsidiaries, business units, the centres and functional units to form a performance-linked incentive and disciplinary mechanism. Assessment criteria and methodology are determined in the form of annual undertaking of target management responsibility and performance remuneration of the management is directly linked with results of appraisal.

- *Information Disclosure Policy*

In strict compliance with the relevant national laws and regulations as well as the requirements of the Securities and Futures Commission and Hong Kong Stock Exchange, the Company issues reports and discloses relevant information in a timely, accurate and complete manner to ensure that investors and stakeholders can keep abreast of the Company's operation and management. Besides, the Company has also established dedicated departments, positions and specific mailbox to enhance communication with its investors. The Company strictly fulfils the confidentiality obligations in information disclosure and there was no significant premature disclosure or misstatement of information in 2019.

2. Risk Management and Internal Control

To ensure the smooth process of the Company's production, operation, and business activities and keep them in line with the Company's strategic objectives, operational objectives and shareholders' vision and in compliance with regulators' requirements, the Company has established a sound risk and internal control system. According to the requirements of relevant laws and regulations such as the Company Law and Securities Law as well as the Listing Rules of the Hong Kong Stock Exchange, the Company has established a risk and internal control system with the Articles of Association as the general rules, and the Rules of Procedures for the General Meetings, Board of Directors and Board of Supervisors and working rules of professional committees as the main framework; established an internal control system consisting of three levels, i.e. the corporate system, fundamental management system and business management system; adhered to the development strategies of the Company; and formed an all-around risk management system through the effective implementation of all sections of comprehensive risk management.

2.1 Organizational System Construction

The Company is dedicated to building a sound, stable and effective risk management system and internal control system. The Board is responsible for the establishment, improvement and effective implementation of risk management system and internal control system of the Company. The risk management committee under the Board is responsible for reviewing the Company's risk strategy, risk management system, work report on risk control, internal control system and procedure, regular assessment of risk management policy, supervision of the implementation of various rules and regulations and material operational decisions as well as assessment of significant matters. The board of supervisors is responsible for supervising the operation of the Company's risk management and internal control system. The General Manager is responsible for organizing and leading the design, operation and assessment and evaluation of the Company's risk management system and internal control system.

2.2 Internal Control System Construction

The Company has established a regulating system covering operation and management of various business activities, formulated and published the Internal Control Manual, Internal Control Evaluation Manual, Comprehensive Risk Management Measures, Assessment Rules for Comprehensive Risk Management, etc., thereby improving the risk management and internal control system.

2.3 Detailed Implementation Plan

In 2019, the Company emphasized on operational risk management, focused on management of project auditing and the hotspots and difficulties in corporate development, made innovation in internal audit method, increased the depth and width of internal audit, and conducted effective risk management and internal control. In 2019, the Company conducted audit on subcontracting projects of industrial units and businesses to promote the compliance of subcontracting business and prevent the risks related to business subcontracting. We conducted audit on implementation of relevant systems and procedures, enhanced the execution capability of all staff, and created the culture of working by rules and procedures. We reviewed the merger and acquisition of and investment in overseas enterprises, conducted comprehensive assessment on risks encountered before, during and after investment in overseas enterprises, proposed risk response measures, formulated risk management regulations for overseas enterprises, and improved the risk management system of overseas enterprises. We also conducted special audit on problem rectification and closed-loop tracking, implemented dynamic management of problems, and fully utilized the internal audit functions of "identifying and solving problems". We implemented annual risk assessment by organizing different professional risk management teams of the Company to conduct dynamic assessment on different business risks, formed the database of risk incidents for 2020 and carried out follow-up management to ensure risks were under control. The Company also performed an annual internal control assessment to assess the effectiveness of the design and implementation of internal control of the Company in phases, which identified that the Company had no material deficiencies. Deloitte Touche Tohmatsu Hua Yong Certified Public Accountants LLP was engaged for internal control audit and the result of which indicated that there were no material deficiencies in terms of the design or implementation of the internal control of the Company. As for the general management issues proposed by Deloitte, the Company proactively organized rectifications and achieved closed-loop management.

3. Combating Corruption and Advocacy of Integrity

In 2019, the Company carried out discipline inspection and supervision works with focus on services, operation and overall development, emphasized on the main responsibilities and tasks of "supervision, discipline inspection and accountability", and effectively facilitated the performance of main responsibility of comprehensive and strict management of the Party through signing of responsibility letters, interview and assessment, mechanism improvement, enhanced supervision and other methods. By focusing on review of problem rectification, eliminating formalism and bureaucracy and carrying out special supervision, the Company specified and performed the responsibility of supervising the comprehensive and strict management of the Party. The Company also continued to create an atmosphere of diligence and integrity by strengthening the education on anti-corruption for the party, facilitating the prevention and control of risks related to anti-corruption and promoting the educational activities of "Remain true to our original aspiration and keep our mission firmly in mind". Based on the reform of discipline inspection and supervision system, the Company deeply implemented the "three transformations" of discipline inspection and supervision works, focused on ability enhancement to facilitate the performance of responsibility, and effectively facilitated the construction of integrity culture of the party and in-depth development of discipline inspection and supervision works, thereby providing powerful political and disciplinary protection for reform and development of the Company.

In 2019, there was no case of corruption in respect of the Company or its employees, and there was no non-compliance of relevant laws and regulations in relation to prevention of bribery, extortion, fraud and money laundering.

III. IMPORTANT HONORS OF THE COMPANY

No.	Honors
1	Ding Rongjun, an academician of the China Academy of Engineering and the chief scientist of the Company, was granted the Science and Technology Advancement Award by the Ho Leung Ho Lee Foundation
2	The League Committee of CRRC Times Electric was recognized as the May Fourth Red Flag League Committee of Zhuzhou
3	The "Construction of Scene Marketing Model of Rail Transportation Technology and Equipment Enterprises" and "Construction of Resources Budgeting, Optimization, Allocation and Management System of High-end Equipment Manufacturing Enterprises based on Strategy Driven Approaches" were awarded the First Prize of Enterprise Management Modernization and Innovation in Hunan Province
4	"A Fast Adhesion Control Method for EMUs" was granted the Golden Award in the 21st China Patent Awards
5	"A Multi-Current Conversion System" was granted the Silver Award in the 21st China Patent Awards
6	"Method for Control of Mixed Operation of Trains with Different Unit Length and CBTC System" was granted the Outstanding Award in the 21st China Patent Awards
7	The project of "Integration, Innovation and Optimization of CTCS-2 Level On-board Control System" was granted the First Prize of Railway Technology Award
8	The project of "Research and Development of New Subway Traction System Platform" was granted the Second Prize (Second Place) in the 2018 (First) China Urban Rail Transportation Technology Advancement Awards
9	"tPower-IC Series of Centralized Air Conditioner Converters" were granted the Innovative Product Award in the China Refrigeration Exhibition
10	The project of "Demonstration of Vehicle and Key Technology Integration of Mid-to-low Speed Maglev Transportation System" was granted the First Prize of the Hunan Science and Technology Progress Award
11	The project "Key Technology of Train Intelligent Sensing and Display System and its Application" was granted the Second Prize of the Hunan Science and Technology Progress Award
12	The joint project of "Key Technology of Platform Gate of High-speed Rail and Rail Transportation and its Engineering Application" was granted the Third Prize of the Hunan Science and Technology Progress Award
13	The project of "Complete Set of Technology and Equipment for Operation Safety Protection of High-Speed Railway Overhead Catenary System" was granted the Second Prize of the National Science and Technology Progress Award
14	2019 Outstanding Electric Control System Enterprise
15	2019 Electric Control System Enterprise with Outstanding Brand



城市轨道交通科技进步奖

证 书

为表彰城市轨道交通科技进步奖获得者，特颁发此证书。

项目名称：新一代地铁牵引系统平台研制

奖励等级：二等奖

获 奖 者：株洲中车时代电气股份有限公司

中国城市轨道交通协会

2019年3月20日

证书号：2018-J-20-2-02-D01



湖南省科学技术进步奖

证 书

为表彰湖南省科学技术进步奖获得者，特颁发此证书。

获奖项目：船舶电力推进系统技术研究及关键装备研制

奖励等级：二等奖

获奖单位：株洲中车时代电气股份有限公司（第2完成单位）

2019年02月27日

证书号：20184039-J2-102-002



湖南省科学技术进步奖

证 书

为表彰湖南省科学技术进步奖获得者，特颁发此证书。

获奖项目：中低速磁浮交通系统车辆及关键技术集成示范

奖励等级：一等奖

获奖单位：株洲中车时代电气股份有限公司（第6完成单位）

2019年02月27日

证书号：20184169-J1-180-006



湖南省科学技术进步奖

证 书

为表彰湖南省科学技术进步奖获得者，特颁发此证书。

获奖项目：列车智能感知与显示系统关键技术及应用

奖励等级：二等奖

获奖单位：株洲中车时代电气股份有限公司（第2完成单位）

2019年02月27日

证书号：20184285-J2-220-002

IV. CORPORATE VALUE AND STAKEHOLDERS

1. Corporate Values

Core value:	Walking the righteous path with the righteous mind and doing good deeds with good intention
Organizational climate:	Positive and harmonious, candid and honest, open and inclusive
Work style:	Strong commitment, sense of timeliness and pursuit of excellence
Spirit of enterprise:	Integrity, Dedication, Innovation and Excellence
Missions:	Connecting the world to benefit human
Vision:	Becoming a leading company group with top multinational operation and rolling stock equipment as its core business

Strategic Guiding Ideology in 2019:

The Company captured the development opportunities in the new era, adhered to the strategic goal, further emancipated its mind and transformed the mindset. Based on the "Three-Year Action Plan", the Company consolidated its position in core industry, achieved breakthrough in five incremental industries and the international market, devoted efforts to "Two Innovations and Two Improvements" (innovation in mechanism, system, technology and quality and improvement of refined management and organizational protection), and established highly efficient organizational management and control system and resource guarantee system, thereby making great progress in the new era of "Double-Hundred Actions".

2. Concerns of Stakeholders

With the core goal of sustainable development, the Company pays close attention to various stakeholders, continuously strengthens exchanges and communication with them, fully understands and collects their requests and makes responses positively in view of the actual situation of the Company. The Company has always strived to cooperate with stakeholders to create and share value and promote sound and rapid development of the Company.

Stakeholders	Ways of Communication	Requirements & Expectations	Main Indicators
Government	Laws and regulations, release of policies, meetings, theme reports, report forms and visits	Complying with laws and regulations, ensuring tax revenue, providing job opportunities, and developing rail transit equipment industry	Total tax income and new job opportunities created
Customers	Collecting comments, daily liaison with and visits by sales representatives	Providing products and services with good quality and competitiveness, and improving them continuously	Customer satisfaction rate and products qualification rate
Investors	Regular report, unscheduled announcement, general meetings and circulars	Continuously enhancing company value, preventing corporate risks and ensuring sustainable development	Profits, return on equity, gearing ratio, owner's equity
Employees	Proposal of Workers' Congress, employee mark-based reward system, executives reception day, consultation, democratic assessment, employee exchange forum, etc.	Providing employees with safe, fair and comfortable working environment, more benefits and growth opportunities	Employee satisfaction and loyalty, turnover rate and investment in employee training
Suppliers	Suppliers meeting, negotiations on contracts and agreements, regular visits, tendering meetings and collecting comments	Long-term cooperation for reasonable profits	Project bidding, claim on quality defect from suppliers, etc.
Community	Communications by such means as suggestion box and questionnaire surveys, festival parties, active participation in and support for community activities	Civilized manufacturing to promote a prosperous and harmonious community with safe and healthy living environment	Investment in community constructions, times of participation in community activities and amount of donations

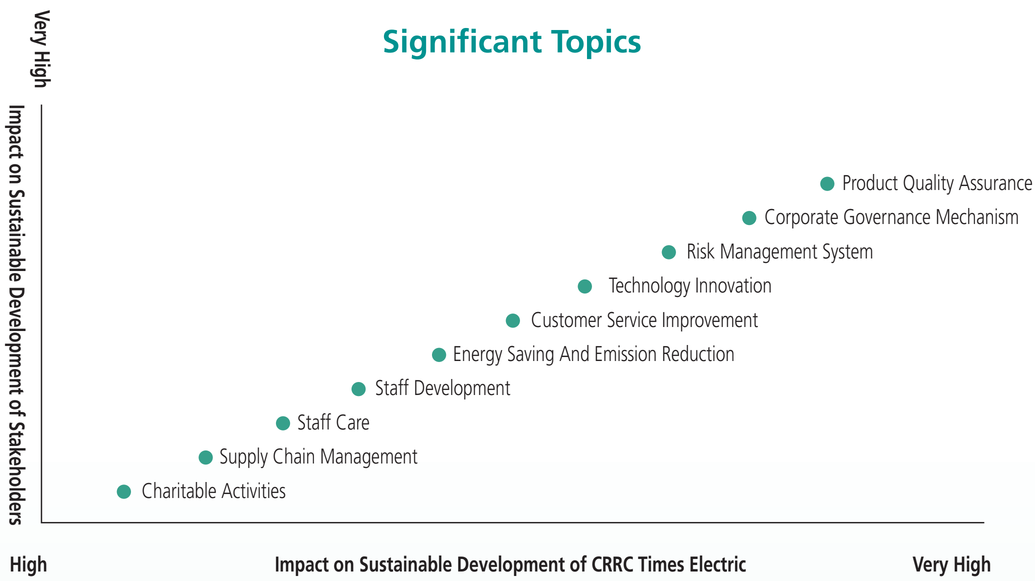
3. Determination of Significant Topics

The Company continued to improve the process for the determination of content for reporting with reference to the requirements of the ESG Reporting Guide of the Hong Kong Stock Exchange. The Company enhances the interaction with stakeholders through various means, identifies and determines material issues that concern stakeholders, and eventually determines the extent and scope of disclosure, so as to ensure a more accurate and comprehensive disclosure of information.

Process of selection of social responsibility issues

Source of issues	Standards of selection
Guidance on Standards of Social Responsibility	Contribution to sustainable development
Company management and staff	General concern of stakeholders
Government and investors	Emphasis on the Guidance on Standards of Social Responsibility
Suppliers and customers	Compliance with the Company's needs of strategic development
Community	
Analysis of information from various channels	

Results of determination of significant topics



V. OPPORTUNITIES AND CHALLENGES

Currently, the PRC economy is under pressure and the growth rate continues to slow down due to the combined effect of shifting into new gears in economy, teething problems in restructuring and digestion of previous stimulation policy. While the overall economy achieves steady development, emerging economies gain momentum rapidly and remains strong. In particular, the high-technology sector and equipment manufacture sector see accelerating growth. With the implementation of the "Go global" strategy for China's railways and the changes in external environment such as further opening up of domestic rail transit market, the Company will face new challenges amidst opportunities.

- ***Opportunities***

China's economy has great development potential in the future. The progress of reform determines the long-term economic performance. The government has sufficient political reserves and resources to handle the risks. After the rapid development in the recent years, China's rail transit industry has laid a sound foundation for the establishment of a comprehensive railway transportation network across the country with the development goal of achieving "tri-networks integration" of trunk railway, intercity rail and urban transit in the future, bringing new opportunities for the growth of rail transit equipment market. In addition, leveraging on the urbanization development, the investment demand for domestic rail transit market has continued to rise. Hence, the intercity rail will continue to be the focus point for the construction of high-speed railway network at the end of the "13th Five-Year Plan" period and during the "14th Five-Year Plan" period.

The "One Belt, One Road Initiative" has brought many development opportunities to the PRC economy. The focus in the near term is to attain the "inter-operability of infrastructure, interconnection of access, convergence of sectors and introduction of resources", while the long-term goal is to achieve the "interconnection of business and culture, integration of regional economies and mutual prosperity". The construction of rail transit has gradually become a global trend. More than 100 countries around the world will invest in railway construction and the annual average procurement needs of rail transit equipment are expected to exceed USD70.0 billion. China's high-speed railway undertakes the mission of promoting domestic high-end equipment to the world, which facilitates the overseas development of relevant enterprises.

At this stage, as China currently encourages autonomy and innovation, the Company's products with proprietary intellectual property rights will become more competitive in the domestic market. As a national strategic industry, the semiconductor industry will enjoy certain attention and support from China, which will bring great opportunities to the domestic market in the future. In particular, as IGBT is in line with the national industry development trend of environmental protection and energy saving, it will be presented with great opportunities. Electric passenger vehicles will become the trend of personal transportation and have great development potential in the future.

- ***Challenges***

Currently, we are facing development changes in four aspects. The first aspect is the ever-changing international environment. The global political and economic situations are complicated with gradual slowdown in macro-economic development and significant increase of uncertain and unstable risk factors, and the new global pattern is forming, which poses challenges to the Company's globalized operation. The second aspect is the change of development mode. In the future, China's economic structure will experience further optimization and upgrade, and will transform from manufacturing industry to "manufacturing industry + service industry" and from "being mainly driven by infrastructure investment" to "being mainly driven by domestic demand and consumption". The third aspect is the transformation brought by technology innovation. A new round of scientific and technological revolution characterized by blockchain, big data, 5G and cloud computing is emerging. Under such trend, information communication, talent concentration and technology development accelerate, resources acquisition becomes more convenient, revolutionary technologies and models continue to emerge, and cross-sectoral innovation and competition have become the new normal. The fourth aspect is the change of industry landscape. During the stage of in-depth adjustment and transformation in railway transportation industry, China Railway Corporation continues to deepen reform with focus on "safety + benefits". The increasing demand for lifetime operation maintenance and the strengthened cost control in railway maintenance process and system pose new challenges to the Company in respect of market expansion, technology innovation, quality and cost. For urban railway, industry resources consolidate at a faster pace, new business models such as PPP turnkey solution continue to emerge, railway operation rights have been fully liberalized, and the restriction and entry barrier for private and foreign investment are further lowered, which lead to intensifying competition in the industry. For competition in common sectors such as industrial converter and passenger vehicle, our comprehensive competitive advantages have yet to stand out.

- ***Our Solutions***

1. Facing challenges and opportunities simultaneously, the Company will increase its innovation efforts. The Company will accelerate the iteration and upgrade of existing products and technologies and fully utilize the "business empowerment effect" of new technologies. It will also fully utilize the Company's multi-system, multi-disciplinary and cross-sectoral advantages.

2. The Company will accelerate the reform by capturing the precious opportunities from reform with full efforts and increasing its efforts to create new growth drivers for the Company's rapid development. The Company will also conduct technological research and planning and make good use of capital strength to rapidly strengthen key capabilities.

3. Through in-depth implementation of refined management, the Company will further consolidate and improve the internal management fundamentals, and make assessment based on data and effectiveness, thereby providing powerful support to the decision-making and services of the Company.

4. The Company will strengthen collaborative development. With an open mind, the Company will strengthen the collaboration, utilize the advantages in resource consolidation and industry collaboration, and continuously optimize the market expansion strategy. It will also make plans based on the overall situation, and adhere to the development principle of concentric diversification, thereby facilitating the collaborative and highly efficient development of the industrial chain.

PART II TECHNOLOGICAL INNOVATION AND PRODUCT RESPONSIBILITY

I. TECHNOLOGICAL INNOVATION

The Company's technological innovation management always adheres to the tenets of serving technological innovation and the Company launches various activities to enhance management performance, including excellent management, refined management and optimization of product approval process. The aforesaid activities increase the intensity, breadth and depth of technological research project management, qualification and result management, external scientific technology reporting management as well as management of expertise and engineering development and standardization. The Company also promotes cost reduction and efficiency enhancement through research and development and revises and improves relevant management procedures and systems of research and development to enhance the working efficiency and quality, thereby safeguarding the orderly development of daily work and steady advancement of various key works at all levels.

1. Introduction to Technical Research and Development

1.1 R&D Management Mechanism

The Company attaches great importance to the establishment and improvement of R&D management mechanism, and has established a Technical Committee, which comprises the deputy general manager in charge of technology, deputy general engineer, technical expert, and technical supervisors in all business units. The Technical Committee provides support for the decision making in relation to technological research technology of the Company. Based on the advanced concepts and ideas such as CMMI and integrated product development ("IPD"), the Company has established a multi-layer and collaborative R&D operation model integrated with fundamental frontier technology, generic technology, platform technology and application technology. It has also established a lean R&D system and advanced information systems such as product lifecycle information platform and knowledge engineering platform, which support the orderly operation of the Company's technological innovation business. The Company fully implemented project management for proposal, execution and completion of technological research, and established and improved the rules and regulations for project management – Administrative Measures for Technological Research Projects and Measures for Assessment and Incentive of Significant Technological Research Projects. It also optimized the approval process of technological research projects, strengthened the collaboration with the market and product line, and completed the pilot run of the approval and management mechanism of product development projects to ensure accurate investment of research and development resources.

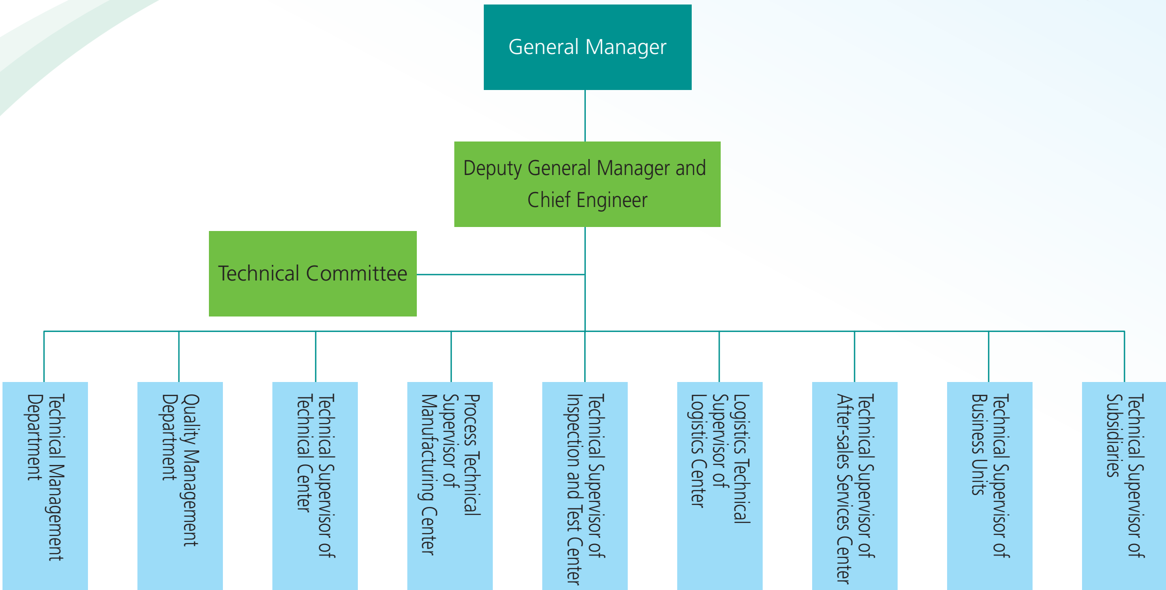


Chart: R&D Management Institution

1.2 Investment in Technological Research

Investment in technological innovation provides basic guarantee for strengthening the Company's independent innovation ability. The work in this regard adheres to two main concepts of "innovation" and "benefit", aiming to achieve sustainable development of the Company and striving to set another new record in operation results by leveraging its technological R&D. The Company continued to increase its investment in technological innovation, which accounted for nearly 10% of sales revenue in the year. In 2019, the Company approved 676 proposals of technological research projects.

1.3 Competitive Edge of R&D Team and Hardware Resources

Over 15% of the Company's employees possess a master's degree or above. On the basis of highly educated talents, a professional research and development team with high qualities and efficiency has been developed through a comprehensive talent training system.

In addition, the Company also possesses strong capabilities in technological research and experiment, testing and inspection and system production, and owns a number of specialized production bases. Among which, the Company's power semiconductor production base mainly produces bi-polar power rectifiers, thyristors, GTO, IGCT and IGBT. The Company also has the first high-power IGBT packaging manufacturing base in China. The inspection and testing system is comprised of over 20 laboratories, including electromagnetic compatibility laboratory, vehicle-mounted electrical systems lab, electrical machinery lab, large-scale vibration testing system lab, electrical equipment reliability and environmental engineering lab, passenger car electrical system lab, large-scale engineering machinery electrical system lab, networking product consistency lab, electrical system semi-physical simulation lab, information technology application lab etc., covering research test, type test and factory test in different business sectors of the Company.

2. Technological R&D Results

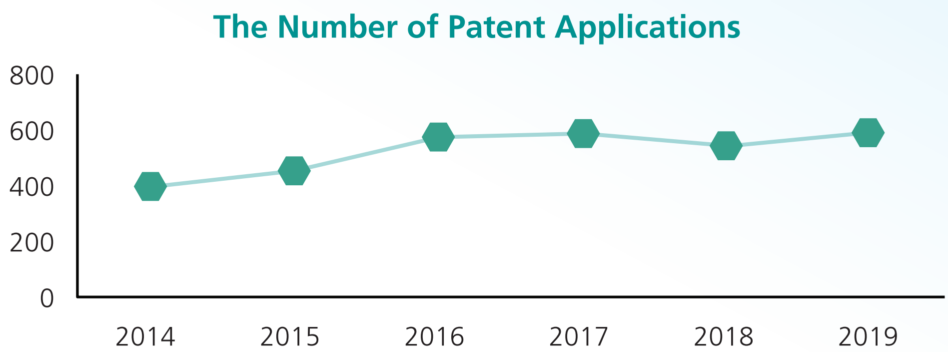
2.1 Application

In 2019, 21 external technology projects of the Company were approved, including: 2 national projects, 8 provincial-level and city-level projects, 1 China Railway project and 10 CRRC major and key projects. The Company deeply participated in the serial projects of China standardized subway test, research and development initiated by the National Development and Reform Commission, and was granted RMB210 million for one single project, which made the Company a participant with largest amount of fund granted.

2.2 Patents

In 2019, the Company applied for a total of 602 patents, with 300 patents authorized, including 189 authorized invention patents. As of the end of 2019, the Company has cumulatively been granted 2,177 patents, 1,141 of which are invention patents.

Year of Application	Number of Application
2014	395
2015	453
2016	574
2017	587
2018	543
2019	603



2.3 Awards

In 2019, the Company was granted 16 awards at provincial level or above. In particular, the projects of "Key Technology and Application of High Voltage and Large Current IGBT Chip" and "Key Technology and Application of Centrifugal Air Conditioning Equipment with Large Capacity and High Efficiency" were granted the Second Prize of National Technology Invention Award, "Research and Application of Key Technology of Traction and Control System of Fuxing EMU with a Speed of 350km/h" was granted the First Prize of the Hunan Science and Technology Progress Award, "Research and Development of Traction System of the Network of Fuxing EMU with a Speed of 350km/h" was granted the Outstanding Award of China Railway Technology, "Key Process and Technology, Production Platform and Industrialization of the Proprietary 8-inch High Voltage IGBT Chip" was granted the First Price of Science and Technology by Chinese Institute of Electronics. It also completed the appraisal of 14 technological achievements.

3. Management of Significant Projects

In order to ensure the sustainable development of its significant technological research projects, the Company insisted on the rolling development mechanism of significant projects and continuously injects new ideas and concepts to guarantee the continuous enhancement of technical strength for technological research. In early 2019, after several reviews by the experts from the Technical Committee, it was finally determined that 42 technological research projects with great strategic significance or economic benefits would be added as significant projects, including key projects such as research and development of electrical traction system of high-speed EMUs, research and development of dual-mode rail grinding vehicles with 96 grinding heads, research and development of electrical system of 3000HP hybrid power trains based on permanent-magnet motor, research and development of TMP-PI permanent magnet simultaneous traction system platform, research of industrial conversion three-phase platform technology and research of key technology of safe computer platform. In 2019, the Company continued to implement the assessment and incentive mechanism for significant technological research projects, strictly put into practice the weekly reporting, monthly reporting and monthly regular meeting system and effectively pushed forward the process control and objective management of significant projects, which ensured the annual targets of 102 ongoing significant research projects in 2019. Through strict process control, the general progress of projects was well under control; of which 59 projects were completed, with an annual project milestone completion ratio of 95.4%.

Examples of major project implementation:

3.1 Research and Development of Urban Railway Electrical Engineering System Integration Technology

The Company established the cloud-based test platform for urban railway safe production system integration based on cloud computing technology, which solved the practical problems of whether the compatibility of cloud-based integration of different sections in the electrical engineering system, the balance of resource allocation among different cloud-based systems and the cloud-based functions and performance meet the application requirements.

3.2 Research and Development of Rail Transportation Automatic Driving Control System

The Company formulated the FAO system solution for intelligent urban railway with the engineering capability of urban railway full automation system, and established the integrated test platform for production functions, engineering design and data verification covering the full product lifecycle. In particular, the tSafer-UC1000 proprietary CBTC signal system which supports FAO has been put into use in Changsha Metro Line 4.

3.3 Development of Locomotive Big Data Comprehensive Operation and Maintenance Platform

The Company completed the development of locomotive big data comprehensive operation and maintenance platform to fully monitor the status of locomotive in a real-time manner through remote monitoring, which enabled verification and optimization of traction system fault diagnosis results, and further met the customers' demand for intelligent operation and maintenance, reduced human involvement and intelligent transformation.

3.4 Research and Development of Electrical System for Europe EMUs

The Company successfully developed the compatible AC25kV/DC3000V power supply system, which is compatible with 5 operation modes of traction converter and network control system, and received the first order in the market of EMUs traction converter and network control system in the European Union, which sets a good example for the Company's expansion in the EMU market in Europe.

3.5 Development of All-in-one Integrated Motor System for Passenger Vehicles

The Company completed the two-in-one/three-in-one integration of electric motor, controller and gearbox, which enabled direct internal linkage between three-phase power supply and resolver with characteristics of small size and high power density and significant advantage in application in high power platform in the locomotive plant.

4. Innovation Influence

In 2019, the Company continued to build the innovation development platform and organized experts to formulate and publish 11 international standards. In particular, the Company participated in the formulation of IEC 61991:2019 "Railway applications – Rolling stock – Protective provisions against electrical hazards" and IEC 63076:2019 "Railway applications – Rolling stock – Electrical equipment in trolley buses – Safety requirements and current collection systems" as the main drafter and other 9 standards as the contributing drafter. It also formulated and published 2 national standards, 1 industry standard and 2 association standards. The Company fully promoted open style innovation, and continued to strengthen the technological exchange and cooperation with domestic and overseas universities and research institutes, thereby continuously improving the Company's influence in the industry.

II. PRODUCT RESPONSIBILITY

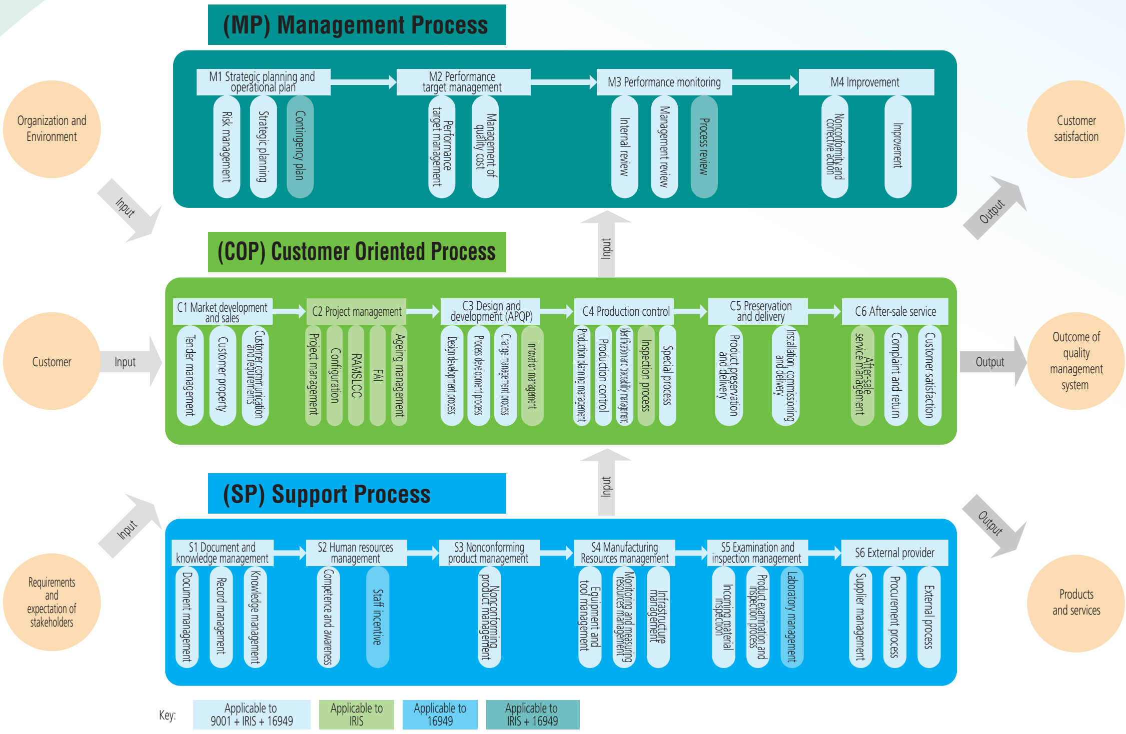
1. Product Quality Management

The Company has always considered product quality as its core value, for it is essential to the very existence of a corporation. Adhering to the policies of "Optimizing platform for sharing of knowledge, Improving the ability of technological innovation, Focusing on quantitative analysis of processes, Setting up life cycle management, Insisting on enhancement of scientific prevention, Enhancing awareness of quality and safety, Paying attention to details and Pursuing customer satisfaction" for quality of its product realization process and customer services, the Company continuously carries out researches and fosters on-going improvement to achieve effective control on all aspects and processes from product design to delivery through a series of assurance mechanisms.

1.1 Quality Management System and Certification

The Company has established a complete quality assurance system based on the ISO9001:2015 quality management standard. It has also complied with the requirements of ISO/TS22163 standard (IRIS 03 International Railway Standard) to implement quality control during the production process of its products and the realization process thereof, while keeping suppliers under strict management and actively promoting project management and RAMS (reliability, maintainability, availability and safety) management.

Quality System Management Mode:



System certificates:

Types of system	Certificate	Description	
ISO9001		The Company passed the ISO9001:2000 version quality assurance system certification of British Standards Institute Limited (BSI) in 2005. It passed the review for the certification (2008 version) in November 2009. In October 2010, TUV Rheinland (Guangdong) Co., Ltd. carried out the review. The Company passed the ISO9001 certification of Bureau Veritas Certification (Beijing) Co., Ltd. in December 2014. The Company passed the review for the certification of German DQS (2015 version) on 28 October 2017.	British BSI German TUV French BV German DQS
International Railway Industry Standard (IRIS)		In October 2009, the Company passed the IRIS 01 certification of TUV Rheinland (Guangdong) Co., Ltd. It passed the IRIS 02 certification in October 2011. The Company passed the IRIS Certification of Bureau Veritas Certification (Beijing) Co., Ltd. in October 2014. The Company passed the review of German DQS in October 2017.	German TUV French BV German DQS
CMMI Level 3		The Company passed the CMMI-system Level 3 certification in December 2009. It passed the renewal review in December 2019.	SEI (Software Engineering Institute)

Types of system	Certificate	Description	
EN15085-CL1 (Welding Certification System for the Rail Transit Industry)		The Company passed EN15085-CL4 certification in November 2012. The Company passed the EN15085-CL1 certification of Bureau Veritas Certification (Beijing) Co., Ltd. on 5 July 2014. The Company passed the EN15085-CL1 certification of German TUV in 2017.	German SLV French BV German TUV

Quality Awards:

First Hunan Governor Quality Award in 2011
Industrial Enterprise Quality Benchmarking Enterprise by Ministry of Industry and Information Technology in 2013
Hunan AA Enterprise for Industrial Product Quality Classification Regulation in 2013
AAA Enterprise of Hunan for Quality Credit in 2013 and 2017
Excellent enterprise of Hunan Province for quality management group activities for eight consecutive years
National excellent quality management group for eight consecutive years
2nd China Quality Award in 2016

1.2 Quality Monitoring Method

The Company has set up and improved a sound and comprehensive system of quality management and assurance system throughout the product life cycle including marketing, design and development, procurement, manufacturing and product services etc. at a preliminary stage through a number of system certifications and effective monitoring of its processes.

Process Monitoring:

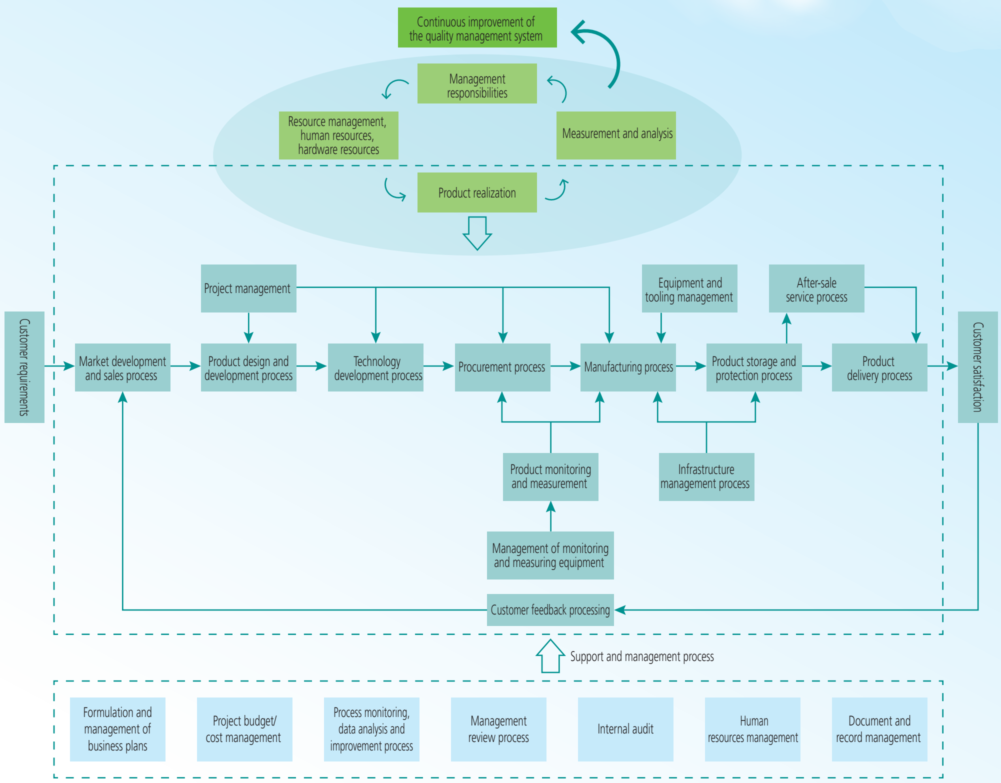
– Quality Indicators for Measurement and Continuous Improvement of System

The Company has established an indicator measuring system for the entire process, including sales, R&D, manufacturing, logistics, procurement and service, etc., which has enabled the Company to comprehensively define and quantize process quality and carry out measurement and monitoring.

– Internal Audit and Inspection

The Company has established a multi-dimensional continuous improvement system to ensure quality control through process review, process testing, internal and external audits, regular management review, ad hoc quality inspection, data analysis, process improvement, etc. With this, the Company can therefore identify opportunities for improvement and request for delegation of responsibilities, implementation of plans as well as tracking and verification for matters which require improvement, with a view to guaranteeing the achievement of the improvement goals and ensuring continuous improvement of the whole quality management system.

Process Relationship Diagram



– Quality Management of Design and Development Process

Complete Product Development Process System:

The system supports the management and quality control of the entire lifecycle of mechanical products, electric products and software products development. Project development is carried out on a project basis and quality control is carried out throughout the development including design, operation, testing and the achievement of design from user requirements to product model finalization.

Platform-Based Development for Product and Design:

With continuous accumulation and construction of relatively complete databases in terms of standards, guidelines and examination of products, technologies and processes, the Company incorporates the databases into the IT information systems and applies them to quality control of new product designs. The Company has also built up a platform for homogeneous product lines featuring huge pool of data that has been widely used and undergone examination for its reliability so as to improve the quality and reliability of product design.

– Quality Management for Production and Manufacturing Process

The Company attaches high emphasis on improvement of technique and adheres to the guiding principle of "paying attention to details" and fully implements refined production by adopting an on-site oriented approach. Accordingly, it establishes standardized technique development process, technique management procedures and working standards for each position. Personnel holding relevant certifications are required for key positions.

A Complete Set of Documentations for Operation and Inspection:

The Company provides detailed and comprehensive guidebooks of operation for the site in which each step of product production technique is prescribed with illustrations. With which, workers at the site can clearly and easily understand each step and avoid faulty operations. Meanwhile, corresponding guidebooks for product inspection, inspection checklists, QC schematic diagrams, etc. are also maintained at the site so that workers can conduct inspection with photos taken for each key process in accordance with these documentations.

Complete Technical Testing System:

The Company's manufacturing bases are equipped with a complete technical testing system including AOI, flying probe test, online test, X-RAY inspection to check the welding quality of circuit boards and high and low voltage lines inspecting device to check the quality and reliability of wiring. A number of technical programs and measures are adopted to check the sealing features of cabinets. The above measures ensure that the whole production process is timely and effectively monitored from a single board to the whole set including cabinet processing.

Stringent Control over Electronic Components:

The Company has also established a sound ESD and MSD control system for the manufacturing bases to exercise stringent control over electronic components in terms of workers, machines, materials, methods, environment and measurement, which in turn helps ensure product reliability.

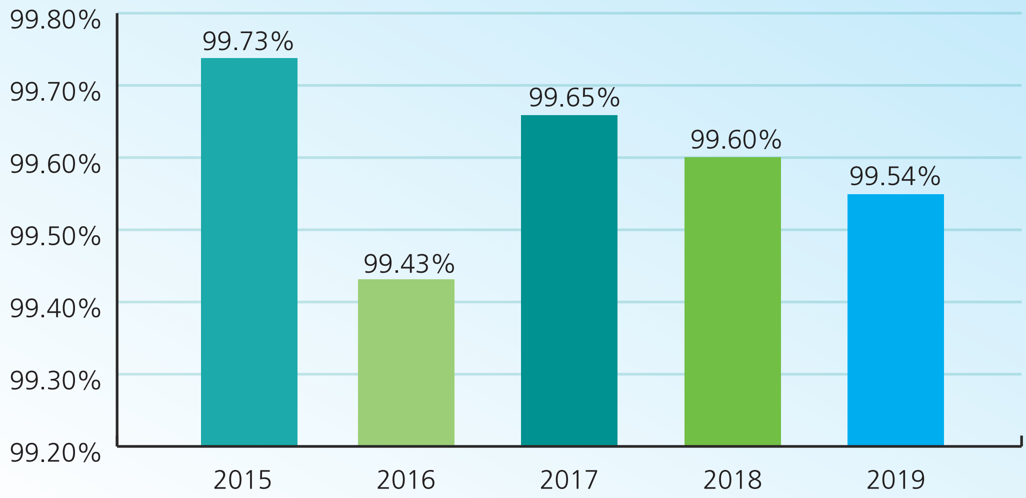
Sound Management System of Outsourcing Suppliers:

The Company has set up an outsourcing control group and adopted an inspection mode pursuant to which on-site inspectors will carry out inspection at the warehouse. In addition, the Company also established a supplier on-site inspection system and held meetings with outsourcing suppliers for the discussion of supplier performance and quality improvement on monthly basis. As such, the Company improved the quality management mechanism in terms of development, prototyping, small scale trial production to mass production by outsourcing suppliers.

– Product Delivery Quality

The one-time passing rate of the Company's products remained at above 99% for the last five years.

One-time Passing Rate



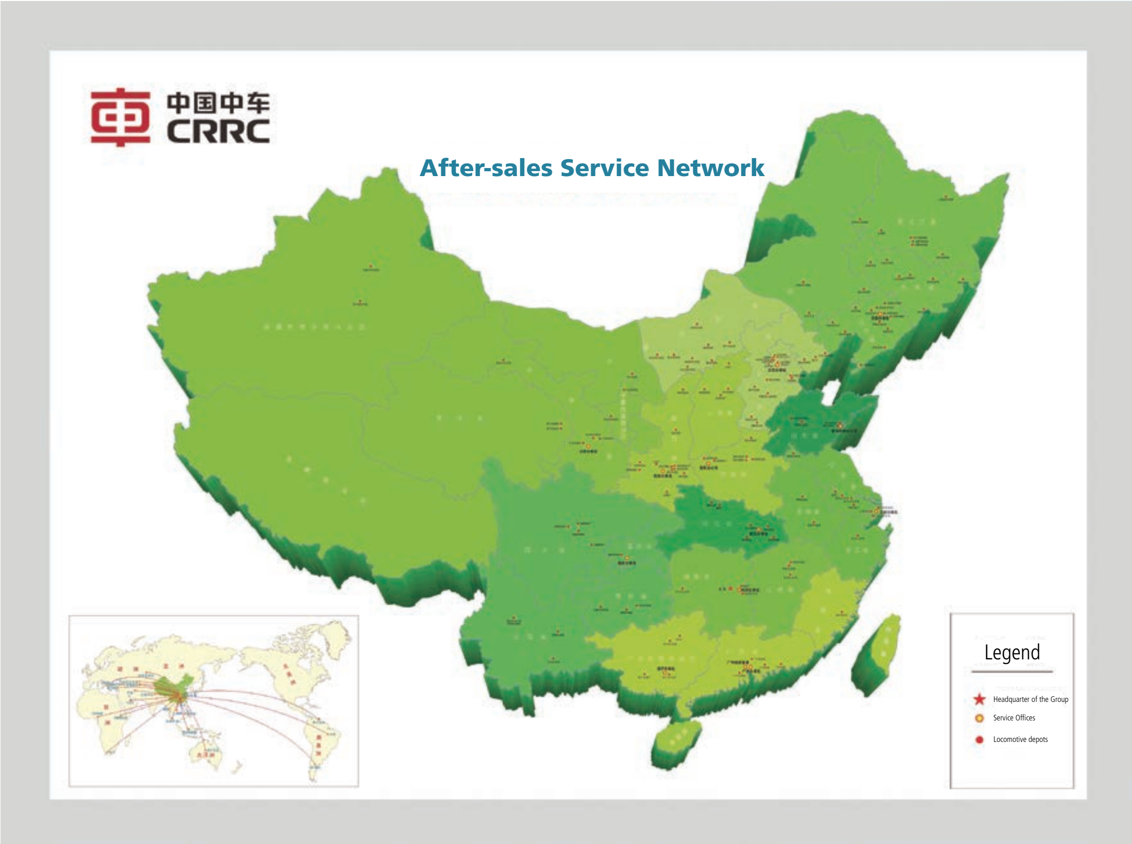
2. After-sales Service

2.1 After-sales Service Network

In 2014, the Company introduced the service philosophy of "providing fast, effective and satisfactory services" in the after-sales service area, aiming to respond to customer needs as soon as possible, and provide comprehensive services to customers in a regulated and orderly manner. For more than ten years, the after-sales service team has grown from a team of sixty to seventy people to a professional team with more than 300 employees. We have set up service offices in Beijing, Shenyang, Shanghai, Xi'an, Wuhan, Zhuzhou, Guangzhou, Chongqing, Lanzhou and other cities and established overseas service offices in America, Africa, Southeast Asia and other areas, which formed the global after-sales service network covering major customers, regions and products. Meanwhile, taking into account the overhaul plan of China State Railway Group Company, Ltd., the Company continuously optimized the overhaul layout, and established 18 regional inspection and maintenance bases across the country and set up inspection and maintenance branches in Qingdao and Luoyang.

The Company has set up a three-level service management model, under which the service network is linked up by the Company's service headquarters, service office and service station. Should our customers have any demands, the Company guarantees to promptly respond with staff deployed to the site in 8 hours and solve problems within 24 hours to gain customers' confidence.

With the after-sales service information platform as our support, we have set up two hotlines: 800-878 8968 and 400-8899 927, and 64 workstations to maintain communication with customers at any time and ensure after-sales services, technical supports, business consultancy, quality feedbacks, complaints, suggestions, and comprehensive information consultation at all times.



2.2 After-sales Service Fundamental Management

Fully implementing the special project service plan. We provided after-sales services for 141 urban railway projects, 82 EMU projects and 158 locomotive projects of the Company. We also arranged manpower to provide on-board repair and maintenance work for centralized power EMUs and standardized EMUs in Jinan and Wuhan. We provided repair and maintenance services for over ten thousand locomotives of 258 users all over the world, which were well praised by domestic and overseas customers with our professional and comprehensive services.

Continuously optimizing information management. Based on "standardized services and refined maintenance", we sorted out and transferred 84,000 failure records from the old portal to the MRO system, and rationalized 8 major operation procedures including commissioning, delivery, consolidation and maintenance. We also prepared 137 data reports for configuration module, service module and supplies module, and achieved service execution conformity rate of over 95% for 24 functions in the MRO system through self-analysis and procedure and system optimization. We also built the independent development capability in the MRO system, developed 3 functions and optimized 1 function, which reduced the informatization cost by approximately RMB400,000 during the year.

Continuously optimizing process and system construction. Based on the management requirements of the Company, we took the lead to carry out process optimization for Green Shade Service, identified and established the L3 process structure for Green Shade Service, and sorted out 50 process modules, which ensured the top-down comprehensive coverage of business management and control. We also focused on the difficulties encountered in the operation and took the problem-driven approach to carry out process optimization with focus on difficulty in service resources appropriation and allocation and fund transfer, deficiency in quality monitoring data in the commissioning process, unspecified responsibility in surrender business and other problems. This also provided support to the demand for subsequent optimization of MRO and OES systems. Through such optimization, it was expected that the maintenance cycle will be shortened from an average of 15 days to 7 days, and the maintenance cost will be reduced by 5%, thereby significantly enhancing the effectiveness and compliance of operation.

Continuously optimizing refined management. Qingdao Inspection and Maintenance Branch of the After-sales Service Centre established a highly efficient refined operation system by systematically sorting out the detailed implementation of inspection and maintenance factory strategy, including mission and target setting, decomposition of strategic objectives, A3 project, introduction of hierarchical meetings, standardization of managers and on-site supervision by leaders. The back repair rate of repaired products decreased by 73%; the on-time delivery rate increased to 86%; the number of items listed as A and B types of quality issues decreased by 52.2%, and the number of items listed as C type of quality issues decreased by 76%, and proportion of inspection and maintenance factory expense and inspection and maintenance factory operating cost in sales income was significantly improved. We also formulated the "Practical Manual for Operation Management of Inspection and Maintenance Factory", which laid a solid foundation for consolidation and promotion of achievements.

Deeply implementing intelligent inspection and maintenance. We put great efforts in establishing professional inspection and maintenance bases and built the first cabinet refined electrical inspection and maintenance production line for high-end inspection and maintenance of EMUs with the support of intelligent technologies. With video inspection technology, industrial robot and other intelligent approaches, we established the automatic assembly system for CI power module, successfully introduced the CI cabinet automatic assembly line, established the ancillary AGV intelligent material distribution system, and achieved highly efficient operation of the CI cabinet assembly and production line. We also established a foolproof and failsafe torque fastening system, independently developed the APU relay unit automatic test platform and CI power module automatic test platform, fully promoted the application of joint operation chart, value flow chart analysis and improvement and other tools and methods in CI/APU/ARF production lines, which enhanced the overall working efficiency by 20% and shortened the average maintenance cycle by 15%.

Further enhancing the overseas maintenance ability. We continued the repair work of overseas key products such as South Africa EMUs and Argentina Inter-City EMUs, completed the training and qualification certification of 9 overseas service engineers in respect of key component repair capability, and repaired 32 converter modules during the year.

2.3 After-Sales Service Team Management

The Company carried out the in-depth development of the talent echelon. The Company fully implemented the strategy of "polarization" and took various measures to train maintenance/service technical experts. Through the "apprenticeship system", skill competition, manager responsibility system, director rotation, green shade service qualification certification and other forms of specialized management and technical personnel training, the Company has created a team of "fine soldiers and strong generals". During the year, the Company cultivated more than 70 key staff; completed post qualification for 381 persons, realizing the annual target of "working with qualification" for staff working at site; achieved new breakthroughs in the evaluation of employee skill level, during which 42 persons reached L4 and 77 persons reached L3. Laborers are included in the scope of skill level evaluation and over 200 persons participated in the test with a participation rate of 90%.



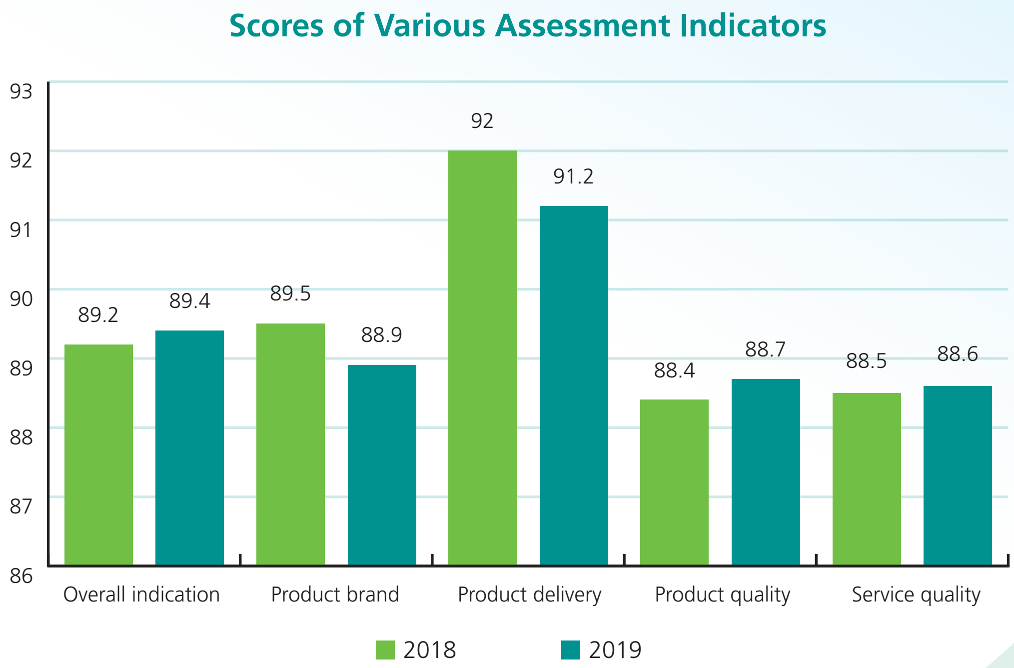
3. Customer Satisfaction Survey and Customer Complaints

3.1 Customer Satisfaction

The Company always takes the continuous improvement of product and service quality and continuous enhancement of customer satisfaction as its goal. Every year, the Company collects customers' opinions and suggestions on our products and services by different means, including questionnaire survey, interview of customers, telephone inquiry and product promotion event, and immediately takes corresponding measures to make improvement.

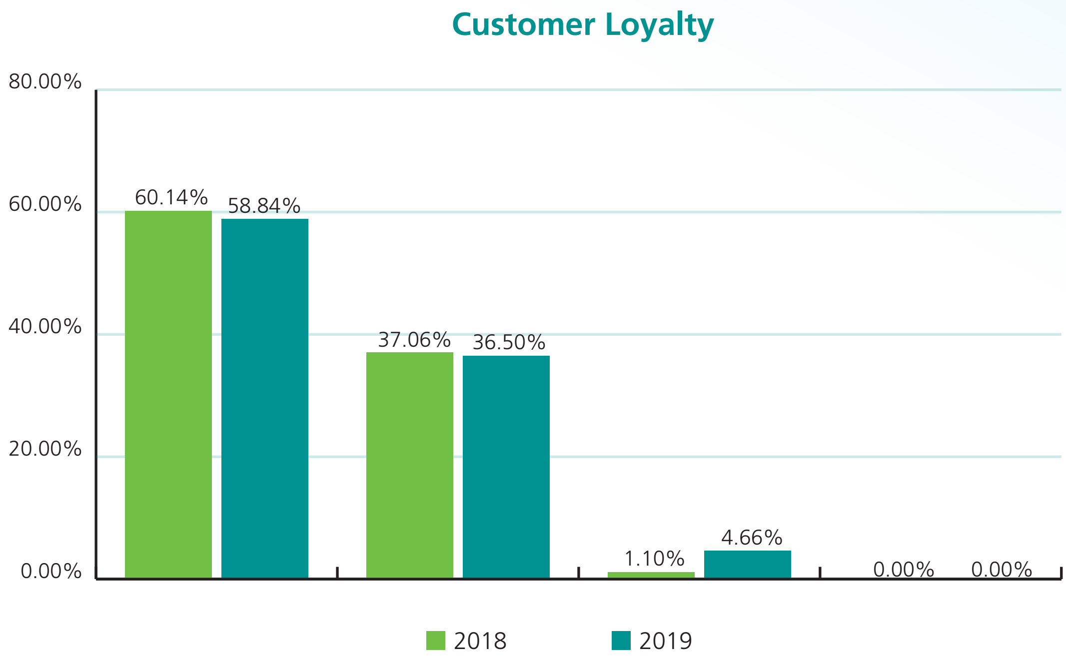
The general principle for 2019 external customer satisfaction survey of CRRC Times Electric was: **focusing on rail transit products while giving consideration to other traditional products**. Products under this survey mainly include railway transportation electric drive control system, security monitoring devices, rail engineering machinery, etc.; and vehicle types involved in this survey include urban rail transit, harmony type high-power alternative transmission locomotive, high-speed EMUs and other traditional products such as testing equipment. This survey involved 148 users, including 18 subway corporations, 14 locomotive depots, 8 EMU institutes, 9 car depots, 10 main engine plants/overhaul plants, 6 road bureaus, 8 local railway users, 16 track maintenance inspection institutes (machinery division), 22 track maintenance divisions and 37 power supply sections. This survey covered 100% major product types and over 90% of our users. Based on customers' feedback and survey data analysis, the assessment indicators on the Company's general customer satisfaction index, product brand, product delivery, product quality and service quality all scored above 86.

Customer satisfaction survey rates in the past two years



3.2 Customer Loyalty

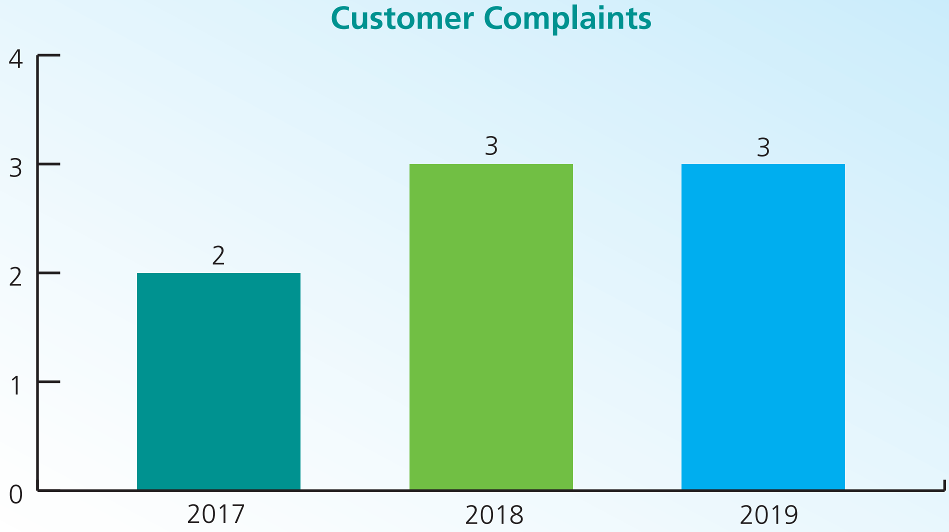
Customer loyalty was 96.4% for 2019, which basically remained flat as compared to 97.2% for 2018. The data of customer loyalty includes the proportion of customers that are pleased and willing to continue to use the Company's products.



	With pleasure	Willing	Probably	Unwilling for now
2018	60.14%	37.06%	1.10%	0.00%
2019	58.84%	36.50%	4.66%	0.00%

3.3 Customer Complaints

The Company attaches great importance to the settlement of customers' complaints and establishes a customers' complaint settlement team led by the quality management department. This team gives fast response to each customer complaint, timely understands customers' demand, conducts in-depth investigation of and analysis on problems, puts forth effective solutions and improvement methods, eliminates problems from the system operation, and replies to customers in a timely manner to ensure their satisfaction.



4. Product Safety

As a large-scale rail transit equipment manufacturing enterprise integrating research and development, production, distribution and sales and a core supplier of components for railway locomotive vehicles, the Company's products are widely used in high-speed trains, and the safety and reliability of its products are therefore directly related to the lives and safety of millions of passengers. Product quality equals to safety, and safety is the life assurance of millions of passengers, which is also the golden rule for an enterprise's survival. The Company has always regarded product safety as the core of its product quality work. Based on the technology safety policy of "**Complying with railway safety standards to establish product safety concept; Understanding product safety effectiveness to improve safety rules and norms; Producing safe and reliable products to ensure train traffic safety**", the Company implements strict control measures on various aspects including marketing, design, procurement, production, delivery and after-sales, and resolutely puts an end to product quality and safety problems.

In 2019, the Company did not violate relevant laws and regulations in relation to health and safety for the products and services provided.

4.1 Guarantee of Product Safety (Reliability)

☆ The Company reasonably utilized the RAMS analysis method and analysis to ensure product reliability and safety by incorporating reliability, availability, serviceability and safety analysis in the whole process of product development.

☆ The Company continued to carry out research and development of key material and technology and analysis of model selection, certification, verification and quality issues, established a comprehensive material management and control mechanism, and enhanced the product reliability.

☆ The Company conducted the accelerated life cycle test and the design of accelerated stress test system for key electrical materials, and carried out in-depth study on failure mechanism and malfunction model, which provided powerful support for reliable product design.

☆ The Company carried out study on expectation of useful life of key components of electrical system by adopting reliability assessment method and establishing useful life expectation model.

4.2 Product Certification

In 2019, the Company has obtained/effectively maintained the CRCC certification for a total of 74 models of railway products under 16 categories in the five sectors of power supply, signal, passenger trains, locomotives and EMU:

No.	Sector	Types of Product	Model & Quantity	No. of Certificate	Issue Date	Issuing Agency
1	Power supply	Vehicle contact network operation status detection device (3C)	1	CRCC10217P10959R2L-27	2018/7/13	China Railway Test & Certification Centre
2	Signal	Train operation control system APT vehicle equipment hardware for CTCS-2	1	CRCC10217P10959R2L-21	2019/2/14	China Railway Test & Certification Centre
3		Train operation monitoring system hardware for LKJ-15	2	CRCC10217P10959R2L-26	2018/8/16	China Railway Test & Certification Centre
4		Train operation monitoring device hardware for LKJ2000	3	CRCC10217P10959R2L	2019/4/18	China Railway Test & Certification Centre
5	Passenger trains	Charger for passenger trains	2	CRCC10217P10959R2L-4	2017/11/16	China Railway Test & Certification Centre
6		Inversion power source for air conditioning of passenger trains	5	CRCC10217P10959R2L-5	2017/11/16	China Railway Test & Certification Centre
7		Charger for passenger trains (including single-phase inverter)	3	CRCC10217P10959R2L-25	2017/11/16	China Railway Test & Certification Centre
8	Locomotives	Network control system for AC locomotives	12	CRCC10217P10959R2L-22	2018/11/8	China Railway Test & Certification Centre
9		Central processing unit for AC locomotives	10	CRCC10217P10959R2L-23	2018/11/8	China Railway Test & Certification Centre
10		Locomotive automatic video monitoring and recording subsystem	1	CRCC10218P10959R2L-9	2019/3/21	China Railway Test & Certification Centre
11		Train power supply monitoring subsystem	2	CRCC10218P10959R2L-10	2019/3/21	China Railway Test & Certification Centre
12		DC600V power supply unit	7	CRCC10218P10959R2L-3	2018/8/23	China Railway Test & Certification Centre
13		Locomotive traction variable current power module	19	CRCC10218P10959R2L-6	2018/8/16	China Railway Test & Certification Centre
14		Traction converter for AC locomotives	3	CRCC10219P10959R2L-027	2019/3/21	China Railway Test & Certification Centre
15	EMU	EMU network control system	2	CRCC10218P10959R2L-15	2018/9/28	China Railway Test & Certification Centre
16		EMU shaft temperature alarm system	1	CRCC10218P10959R2L-19	2018/2/1	China Railway Test & Certification Centre
	Total		**74**			

4.3 Improved Test and Verification System

☆ Approval and Authorization

The Company invested in and constructed laboratories with relevant qualifications.

☆ Inspection and Testing Capability

Traction system laboratory

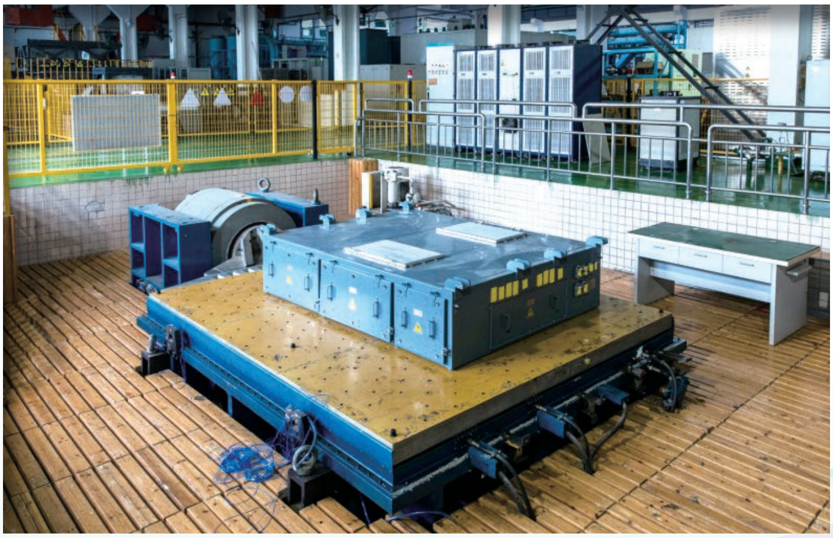
The traction system laboratory is capable of conducting all testing and research of portfolio system based on the latest requirements, such as the IEC61377 family of standards. The temperature rise test of route distribution network, energy consumption test of route distribution network, traction and drive conversion test, anti-skid test as required by the latest standards and regulations are available to meet the national whole vehicle testing requirements of converter, traction motor and control system applied in high-speed EMUs, urban railway trains, electric locomotives, diesel locomotives, industrial transmission and other fields.



☆ Environment and sustainability laboratory

(1) Climate and environment testing capacity

The climate and environment testing system is capable of conducting thermal, thermal change and thermal shock test, steady state damp heat test, alternating temperature and humidity test, icing test, salt spray test, dust and water resistant test (IP68 and below), operational condition, insulation and dielectric voltage withstand test and temperature rise test of electric and electronic products based on national standards and IEC standards, and the full power test for 150 kW inverters with a weight of 6,000 kg at high and low temperature.



(2) Testing capability in mechanical environment

The mechanical environment testing system meets the requirements of vibration and shock testing of electric traction system and equipment, network control system and equipment, and other products for locomotives. It is also capable of conducting vibration test and data analysis for on-site operation. It has comprehensive portfolio of environment and sustainability testing of parts and leading testing capability in the industry.

☆ Electromagnetic compatibility laboratory

Electromagnetic compatibility laboratory is capable of conducting tests on strength of magnetic field, electromagnetic radiation, disturbance voltage at power supply end and disturbance current. The testing frequency of the EMI testing system is 18 GHz, while that of the EMS testing system is 8GHz. It is capable of conducting radio-frequency and electromagnetic field radiated immunity test at 30 V/m, which covers the 4G and 5.8G fields and outperforms industry peers. In particular, the 10m semi-anechoic chamber meets the anechoic testing requirements for major equipment such as inverters and air conditioners for locomotives.



☆ Network and wireless laboratory

The network and wireless laboratory has formed the leading network consistency testing system, wireless communication testing system and point responder testing system in the PRC. With environmental collection, image processing, distributed database and other advanced technologies, it is capable of conducting consistency test of route network communication products for urban transit, locomotives and EMUs, dynamic simulation test of on-board WiFi and wireless communication equipment and other tests.



PART III ENVIRONMENTAL PROTECTION

I. ENVIRONMENTAL PROTECTION POLICY

We pursue the policy of people-oriented, continuous improvement, environmental protection, health and safety.

II. DATA ON ENVIRONMENTAL PROTECTION PERFORMANCE MANAGEMENT

1. Discharge of Industrial Solid Waste and Hazardous Waste

Our Company sorts, collects and stores solid wastes in the same manner as general industrial solid wastes and hazardous wastes. Our Company will put priorities on the recycling of the general industrial solid wastes, whereas unrecyclable wastes will be sent to qualified units for hazard-free disposal and hazardous wastes will be sent to the relevant units responsible for hazardous waste treatment for disposal. Our Company strictly follows the relevant national laws, regulations and policies in the process of hazardous waste treatment. Hazardous waste transfer sheet will be completed and reported to Zhuzhou Environmental Protection Bureau for record upon transfer. During 2019, the Company generated a total of approximately 245 tons of hazardous waste. A qualified treatment rate of 100% was achieved.

2. Discharge or Emission of Waste Water and Exhaust Gas in Compliance with Required Standards

Year	Volume of wastewater discharge (ten thousand tons)	Volume of wastewater treatment (ten thousand tons)	Compliance rate of discharge
2014	41	41	100%
2015	36	36	100%
2016	16	16	100%
2017	25	25	100%
2018	22	22	100%
2019	19	19	100%

In 2019, the Company strictly followed the relevant regulations and standards to manage sewage treatment and exhaust gas treatment facilities. All pollutant discharge data, as supervised and monitored under the entrustment of the Company and by monitoring authorities and government environmental protection administration, conformed to the emission standards. A compliance rate of 100% was achieved.

In 2019, the industrial wastewater discharge, emission of industrial exhaust, chemical oxygen demand and ammonia nitrogen emission of the Company amounted to approximately 190,000 tons, approximately 2.0 billion cubic meters, approximately 9 tons and approximately 1 ton respectively for the year.

III. ENVIRONMENTAL MANAGEMENT

1. Environmental Management System and Certification

The Company obtained the certification of ISO14001 environmental management system in 2006. Through the process control under the environmental management system such as performance monitoring, internal audit, supervision, check, management review, the operational performance of the Company's environmental management system has improved continuously. In November 2017, the Company passed the upgrade review of British Standards Institution (BSI) for its ISO14001:2015 environmental management system certification. In November 2018, the Company passed the external audit of British Standards Institution (BSI) for its ISO14001:2015 environmental management system. In November 2019, the Company passed the external audit of British Standards Institution (BSI) for its ISO14001:2015 environmental management system.



Certificate
of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2004

This is to certify that:

Zhuzhou CSR Times Electric Co., Ltd.
Shidai Road
Zhuzhou
Hunan
412001
China

株洲南车时代电气股份有限公司
中国
湖南省
株洲市
时代路
邮编：412001

Holds Certificate No: EMS 76205

and operates an Environmental Management System which complies with the requirements of ISO 14001:2004 for the following scope:

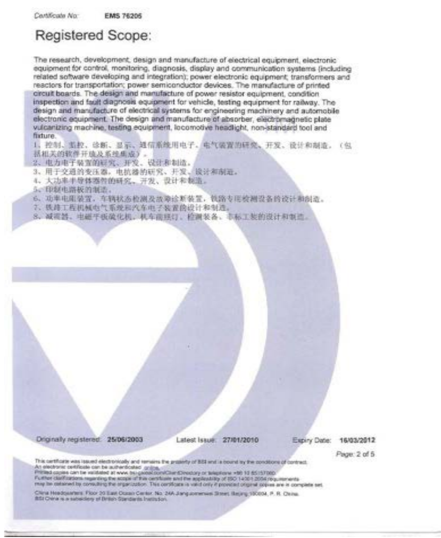
Please see scope page.

For and on behalf of BSI:

Managing Director, BSI (China), Liu Mo Yuan

Originally registered: 25/06/2003 Latest Issue: 27/01/2010 Expiry Date: 16/03/2012

Page: 1 of 5



Certificate No: EMS 76206

Registered Scope:

The research, development, design and manufacture of electrical equipment, electronic equipment for control, monitoring, diagnosis, display and communication systems (including related software developing and integration); power electronic equipment; transformers and reactors for transportation; power semiconductor devices. The manufacture of printed circuit boards. The design and manufacture of power resistor equipment, condition inspection and fault diagnosis equipment for vehicle, testing equipment for railway. The design and manufacture of electrical systems for engineering machinery and automobile electronic equipment. The design and manufacture of absorber, electromagnetic plate vulcanizing machine, testing equipment, locomotive headlight, non-standard tool and fixture.

1、控制、监控、诊断、显示、通信系统用电子、电气装置的研究、开发、设计和制造。（包括相关的软件开发及系统集成）。
2、电力电子装置的研究、开发、设计和制造。
3、用于交通的变压器、电抗器的研究、开发、设计和制造。
4、大功率半导体器件的研究、开发、设计和制造。
5、印制电路板的制造。
6、功率电阻装置、车辆状态检测及故障诊断装置、铁路专用检测设备的设计和制造。
7、铁路工程机械电气系统和汽车电子装置的设计和制造。
8、减振器、电磁平板硫化机、机车前照灯、检测装备、非标工装的设计和制造。

Originally registered: 25/06/2003 Latest Issue: 27/01/2010 Expiry Date: 16/03/2012

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ISO14001 Environmental Management System Certificate

2. Environmental Protection Products

In the process of production, the Company always advocates the "Green" concept of CRRC's core brand value and vigorously promotes the use of environmentally-friendly materials and environmentally-friendly technologies so as to create environmentally-friendly green products for the society.

IV. DESCRIPTION OF ENVIRONMENTAL COMPLIANCE

Prior to project construction, the Company actively carried out environmental impact assessment of construction work so as to ensure that the environmental protection facilities and construction projects will be designed, constructed and put into operation at the same time.

During the process of production and operation management, the Company has complied with the relevant national, provincial and municipal environmental protection laws, regulations and statues, and that of the Ministry of Environmental Protection, and timely obtained, updated and conveyed the relevant environmental protection regulations and standards. The Company conducted its day-to-day internal environmental protection management based on these new regulations and standards. Meanwhile, the Company actively fulfilled its corporate environmental protection obligations and implemented the principles and policies of national energy saving and emission reduction. There was no penalties imposed by the relevant departments due to any violation of environmental regulations.

V. ENERGY SAVING, CONSUMPTION REDUCTION AND COMPREHENSIVE GOVERNANCE

1. Energy Saving and Consumption Reduction

In 2019, with the mission of "Leading the development of green equipment and creating a better life for human being", CRRC Times Electric strived to establish the green manufacturing system, actively carried out energy saving and consumption reduction activities, and facilitated the efficient recycling and utilization of resources, which reflected the Company's high-end equipment manufacturing capability and performance of social responsibility.

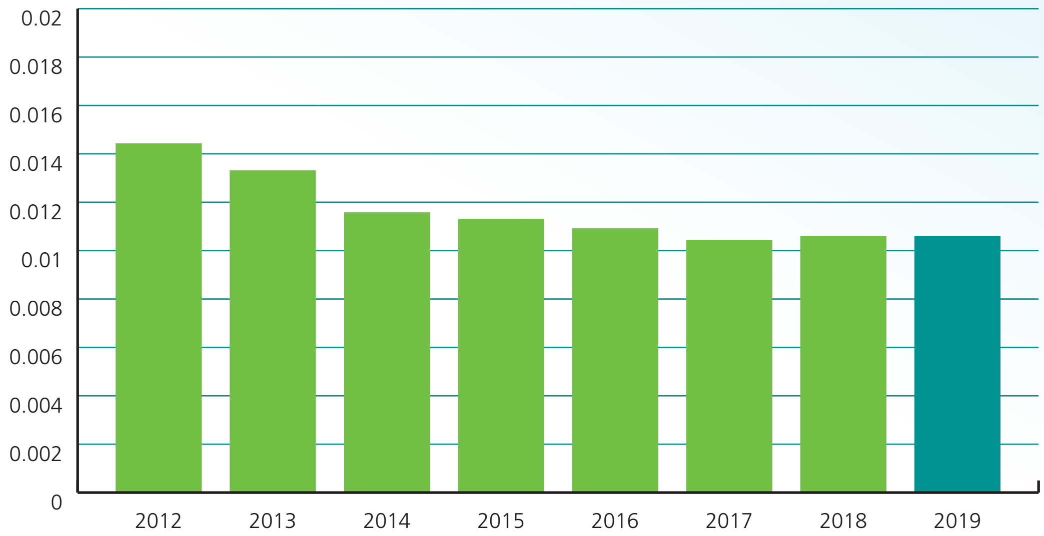
1.1 Strict control of energy objective and indicators

The Company's energy indicator for 2019: comprehensive energy consumption per RMB10,000 in output value <0.0115 tons of standard coal per RMB10,000.

Actual annual energy consumption: power consumption: 91,270,000 kWh; natural gas consumption: 4.65 million cubic metres; water consumption: 1.22 million tons, the comprehensive water consumption per output of RMB10,000 was 0.94 tons/RMB10,000.

Comprehensive energy consumption per RMB10,000 in output value: 0.0107 tons of standard coal per RMB10,000, representing a slight decrease as compared to last year.

Comprehensive energy consumption per RMB10,000 in output value (Tons of standard coal per RMB10,000)



1.2 Innovation and upgrade of energy management system

In 2019, in view of the Company's situation of various business departments and fragmented organizational structure, the Company proposed the concept of implementing energy management based on business lines, made comprehensive adjustment to the Company's organizational structure and management mode of energy management, and implemented the "three categories" innovative management mode. In particular, based on the characteristics and current situation of the Company, 7 non-railway business segments including virtual headquarters, traction converter and semi-conductor were divided into three categories, namely independent business unit, headquarters of virtual business division and subsidiaries outside of headquarters of virtual business division. Independent business unit shall establish a fully independent energy management system which is subject to supervision, inspection and appraisal by the headquarters, and carry out business with reference to the headquarters of virtual business division. For headquarters of virtual business division, the energy management shall be carried out by the headquarters of the Company to enhance the efficiency of comprehensive utilization and management of energy. For subsidiaries outside of headquarters of virtual business division, the Company will emphasize on providing support and guidance in respect of energy saving and cost reduction works.

After the implementation of "three categories" innovative management mode, all units have established a unified KPI appraisal system with comprehensive energy consumption per RMB10,000 in output value as the performance indicator, thereby achieving the target of standardization of corporate management system. Under the new management mode, the Company redetermined the scope of energy management and the boundary of energy measurement, that is, based on the composition of output value, all wholly-owned and share-holding domestic units and departments, including all business units, resource centres and subsidiaries outside of headquarters are included in the Company's scope of energy management. In addition, the Company also required that all headquarters and branches shall adopt the financial data of output value, revenue, utility and power expense as the statistical indicators of energy consumption, and shall carry out energy management based on comprehensive budget management and control, thereby achieving the target of strict control of energy consumption through strict management and control of utility and power expense.

1.3 Continuous informatization of energy management

In 2019, based on the unified plan of the headquarter of CRRC, all subsidiaries were included in the new energy and environmental protection information system. The monthly energy consumption, energy consumption per RMB10,000 in output value, proportion of energy expense and cost, heat recovery, utilization of reclaimed water and energy efficiency data of nine types of energy consuming equipment of CRRC Times Electric were all included in the unified information management system of CRRC. The Company also established unified internal management and appraisal standards, which laid a foundation for benchmarking management in the industry.



Interface of motor power energy intelligent management system

In addition, the Company commenced the construction of motor power energy intelligent management system in 2019. The Company carefully sorted out the energy measurement account, equipment account and expense account of the existing three industrial parks at headquarters, and identified the nature of units and departments and types of functions of different measurement devices. By establishing the intelligent comprehensive management platform based on network resource digitalization, the Company consolidated and analyzed the data and information of different systems in the industrial parks, thereby achieving systematic and digital operation management in the industrial parks. The industrial park comprehensive management system gradually combines with production business management and utilizes high definition video data to assist the management of production business system data, thereby enabling visualized production management, enhancing the production efficiency of industrial parks and improving production business management through customized video services. Through comprehensive management of industrial parks, the Company can achieve safe, intelligent, highly efficient and energy saving operation in the intelligent industrial parks.

1.4 Continuous investment in energy saving modification

In 2019, the Company made an investment of RMB2.8 million in energy saving modification, representing a year-on-year increase of 150%. By enhancing the water resource utilization rate, improving the configuration of high-voltage power distribution system and actively carrying out a series of energy saving technical modification projects for air conditioning and lighting systems, the Company saved energy consumption of approximately 200 tons of standard coal, and reduced energy cost by approximately RMB5.7 million, thereby lowering the cost and boosting the efficiency by 6%.

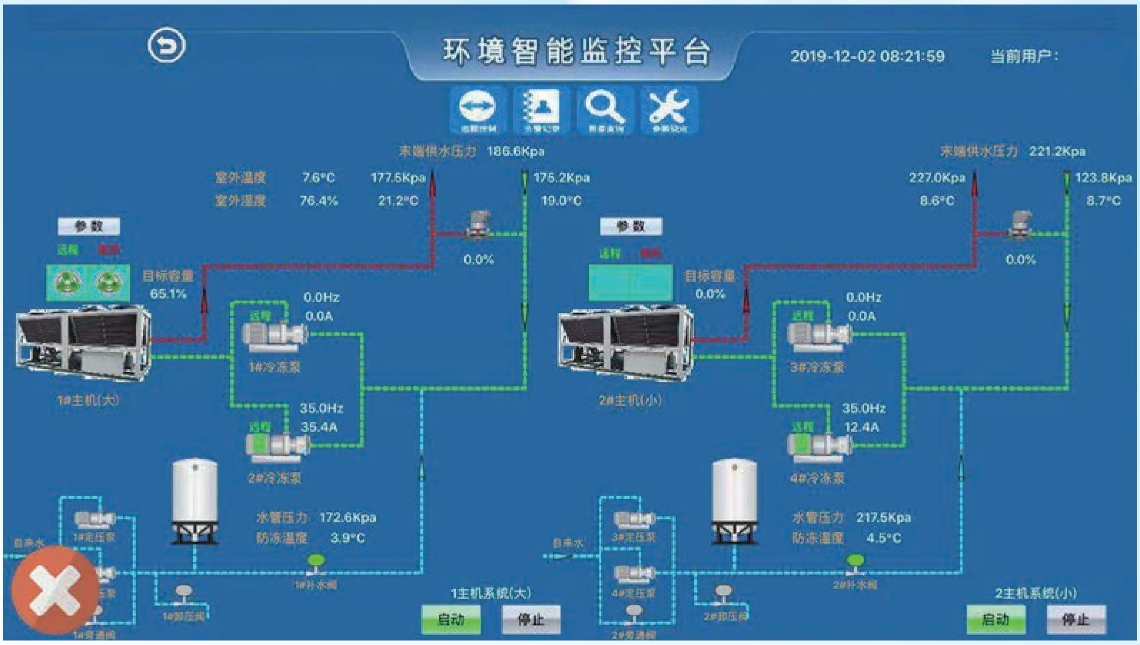
Based on the operation status of purified water system, the semi-conductor business division analyzed the amount and relevant indicators of RO concentrated water generated, made modification for concentrated water recycling, and achieved great result in terms of water quality and recycling performance, thereby creating significant economic benefits. After the implementation of concentrated water recycling modification project, the daily water consumption of purified water system decreased by 120 tons as compared to last year, saving a total of 45,155 tons of raw water throughout the year. In addition, 3,500 28W fluorescent lamps in the factory of the IGBT manufacturing centre were changed to 16W LED lights, which may save energy by 43% at the same luminance condition, saving power consumption of over 183,900 kWh per year.





Concentrated water recycling system of the semi-conductor business division

The Centralized Procurement Centre carried out the variable frequency and centralized control modification for its central air conditioning system, in which intelligent centralized control system was installed, the original working frequency water pump underwent variable frequency modification, and remote operation and equipment energy consumption monitoring functions were added in the system, which can save power consumption of approximately 300,000 kWh per year.



Intelligent centralized control system for central air-conditioning system of the Centralized Procurement Centre

2. Social Management and Comprehensive Governance

In 2019, the Company's social security comprehensive governance work closely focused on its overall objectives of technological research, operation, production and management, closely followed the social security comprehensive governance organizations, rules and regulations, and functional responsibilities. The Company promoted the construction of a multi-level comprehensive governance system with hierarchical grading, and continued to improve the fire prevention organization, multi-level responsibility system, relevant rules, regulations and procedures, reasonable and complete operation of facilities and equipment and emergency response management. In addition, through problem-oriented approach, the Company formulated relevant rules and regulations, strictly implemented the key guidelines of "nine nos" set out in the Annual Statement of Comprehensive Governance Responsibility with the key objectives therein as the annual work objectives, and fully achieved the annual work objectives.

2.1 Focusing on fundamental construction to facilitate in-depth management of comprehensive governance

(1) Based on the requirements of reform of working organizations and the adjustment of leadership, we completed the establishment of organization for comprehensive governance of social security of the Company in a timely manner and issued the relevant adjustment documents. We also organized different departments to sign on the Annual Statement of Comprehensive Governance Responsibility. Based on the actual condition of comprehensive governance in different departments, we completed the preparation of Annual Target and Working Plan for Comprehensive Governance and the Working Record of Internal Security and other fundamental tasks. Over 30 first class statements of responsibility and hundreds of second class (workshops and teams) were signed, which achieved total coverage and all-staff participation of comprehensive governance and target management.

(2) We continued to improve the working mechanism to ensure the implementation of tasks of comprehensive governance of safety. By relying on the social security comprehensive governance working committee of the Company and with the target of centralized management by specialized departments, we continued to improve the mechanisms of comprehensive governance committee, emergency response committee, fire safety work leading group, internal security work leading group, safety unit construction work office and other organizations of comprehensive governance of security, which formed a highly efficient and orderly comprehensive governance and safety management system and laid a foundation for fully achieving the annual target of comprehensive governance.

(3) We continued to improve relevant rules and regulations, which provided legal guidelines and basis for facilitating the comprehensive governance and management works. Based on the requirements of actual and functional adjustment of the Company, we completed the revision and issuance of statements of responsibility for fire safety, transportation, comprehensive governance and annual target of comprehensive governance and management, appraisal rules and other relevant rules and regulations. Based on the requirements of the senior management, the terms of appraisal of public relation events and troublemaking incidents were included in the comprehensive governance appraisal rules for the first time in order to further strengthen daily safety management and control.

(4) According to the instructions of the high level of authorities and based on the current working requirements of security, stability maintenance and counter-terrorism, in order to strengthen the internal safety management during holiday, prevent the occurrence of material internal security and criminal cases and incidents, traffic accidents and other cases and accidents, ensure the safety and security of the Company during the National Day holiday, and meet the target of "preventing risks, ensuring safety and celebrating major festival" in specific period, the Company organized over 50 people from its subordinated units, local security departments and entrusted safety management entities to convene special deployment meeting to ensure the safety and stability of the Company during specific period.

2.2 Promoting full participation in establishment of comprehensive governance working mechanism

(1) According to the working requirements of the local government, the Company carried out the promotion campaign of "Combating Criminal Syndicate" which lasted for one month. During the campaign, all units made 34 promotional banners, published 55 sets of promotional materials, and continuously displayed the promotional videos and slogans on the media platform on a 24/7 basis, in order to mobilize the employees to pay attention to and report surrounding criminals and combat criminal activities with an unwavering mind.

(2) The Company organized, instructed and assisted different units to provide 11 fire trainings such as fire emergency response skills, fire prevention, evacuation, self-rescue and mutual rescue to the members of voluntary firefighting team and "micro fire station", staff in fire control room and regular staff, and organized and instructed the headquarter to conduct 9 emergency drills. In addition, each unit organized on its own 10 drills with focus on fire safety.

(3) The Company assumed its responsibilities in a practical manner and increased its efforts in supervision, inspection and instruction of comprehensive governance and safety management. It also organized and passed 11 comprehensive governance and safety inspections (including 4 inspections outside the headquarter), and fully and continuously enhanced the comprehensive governance and safety management standards and prevention and control capabilities of the Company and its subordinated units.

(4) Based on the working principle of "combining prevention and management and control", we fully strengthened the responsibility awareness in protective areas, and strictly implemented the shift work system. With the concerted efforts of all security personnel, we successfully completed different tasks of "Chinese New Year", which laid a solid foundation for the internal security protection and control during holidays.

(5) We continued to strengthen the supervision of party entrusted with internal safety management, and continuously enhanced the skills and abilities of security personnel and management personnel through different platforms and channels. Meanwhile, we also linked the daily task appraisal management with the monthly subcontracting charge for security business, and implemented and supervised the daily management based on the reward and punishment appraisal system, thereby creating a safety management situation of "joint supervision and management".

(6) We continued to facilitate the construction of "joint defense and coordination and information sharing" platform, strengthened the information exchange and communication with local police, made preparation for emergency response and provided meaningful advice to the leaders.

2.3 Strengthening fire prevention management and enhancing the ability in fire prevention and control and self-rescue

(1) In order to improve the "firewall" project of all units, solidify the effectiveness of fire safety infrastructure, strengthen the regular and fundamental works of fire safety management and keep the fire facilities in buildings intact and effective, the Company engaged third party to conduct authoritative inspection on the fire facilities in Times Technology Building at the headquarters, public rental housing and other buildings. The inspection results were in compliance with the requirements of relevant regulations, and the system was running normally and effectively.

(2) Based on the requirements set out in the instructive documents from the fire departments at provincial and municipal levels, we continuously provided trainings on emergency skills to members of "micro fire station", which laid a foundation for the early rescue, small-size extinguishment, three-minute in position as well as interactive emergency response for early stage fire accidents.

(3) We continued to implement the building fire safety equipment maintenance system. For public area in the headquarters of the Company, we have invested over RMB1 million, replaced and repaired 11,270 fire extinguishers, replaced over 400 emergency lamps and 200 aged fire hoses, which ensured the normal operation of fire safety facilities, equipment and systems.

(4) We actively carried out rectification of fire hazards. Firstly, we spent nearly RMB500,000 to effectively rectify the problems in fire service pipelines and water tanks, which ensured the water supply for fire safety in the industrial parks. Secondly, we spent nearly RMB100,000 to replace the malfunctioned automatic fire alarm system, which ensured the fire safety.

(5) With the target of improving the Company's "ability in fire safety training and education", we increased our promotion efforts to enhance the safety awareness among our staff. Through the activities of national "Production Safety Month" and "119" fire safety promotion day, we promoted fire safety in various ways including display of pictures and fire accident records and promotion of relevant laws and regulations and safety knowledges. We also made PPT training materials on fire safety laws and regulations, fire safety management, fire safety basic knowledge and emergency response management and presented such material on the OA network and television wall. During the year, we engaged Hunan Fire Protection Association, Puxie, Xiecheng and other fire safety training institutes to provide 7 trainings for all business units with over 2,000 participants.

(6) In addition to improving the infrastructure, we also emphasized on meeting the requirements of "Three Simultaneities" in respect of fire safety and other fire safety management regulations, participated in the assessment of fire safety design of various new construction, modification and expansion projects, prioritized the "responsibility" and "management" of safety management, and enhanced the "level of fundamental safety" of various buildings and facilities, thereby avoiding the risks related to fire safety responsibility.

(7) We carried out feasibility study and formulated the plan for intelligent fire safety remote monitoring system of industrial parks. Based on the existing project report, assuming that the safety management function remained unchanged, through intelligent and information management of the intelligent fire safety remote monitoring system, the number of security staff can be reduced to 16 persons after optimization and consolidation of the functions of security staff in the industry parks, saving an expected amount of nearly RMB1 million of labour cost per year.

2.4 Strengthening traffic management and enhancing emergency response capability of shuttle bus in a practical manner

(1) To safeguard the life and property of the Company's shuttle bus passengers, we strengthen the operation safety management of shuttle bus and conducted inspection on the condition of employee shuttle bus. We also carried out non-scheduled inspection for shuttle bus and reported the items that need rectification to demonstrative operators and required rectification in a timely manner. During the year, we conducted 4 quarterly inspections and 7 routine inspections, operated 12 shuttle bus routes, finished 5,350 trips and transported 67,760 person-times with no traffic accident.

(2) According to the requirement of the higher authority on "carrying out shuttle bus safety hazard identification and elimination", we fully enhanced and strengthened the safety management and control of employee shuttle bus to identify and eliminate safety hazards in a timely manner and ensure safety.

(3) The Company carried out emergency drill on road safety and evacuation, emergency drill under the theme of "Fire Safety and Evacuation" and training on road safety knowledge mainly for drivers with service personnel as the supporting role.

(4) To alleviate the road safety pressure at the entrance of the Company and ensure safe and orderly access of motor vehicles, we arranged road safety coordinators to maintain road safety and order on a regular basis during specific period (on and off work) on working days. In addition, we established a team to assist the local traffic police department in maintaining road safety within the area of the Company for 128 times during the year.

2.5 Strengthening emergency response and stability maintenance and constructing and improving emergency response system

(1) The Company organized, guided and completed the further improvement of its emergency management organization and the update and revision of the overall emergency plan, unified coordination and promotion of the timely update and improvement of each affiliated special plan to ensure that such plans are close to reality and practically improve scientificity, operability and rationality.

(2) We continued to strengthen the supervision, guidance and appraisal of the security and emergency response team. With the target of "improving the individual skills of emergency response", we increased our efforts in education and training, and further enhanced the awareness of safety, responsibility, service and emergency response among security and emergency response personnel, thereby continuously maintaining and enhancing the emergency response ability and emergency response management level of the Company.

(3) According to the requirements of local police department on strengthening local efforts in counter-terrorism and stability maintenance and the requirements proposed by the review experts, we invested over RMB50,000 in the acquisition of fire safety and counter-terrorism emergency equipment, including 400 respirators, 50 toolboxes and 3 sets of counter-terrorism equipment.

(4) We formulated the special emergency response plan and treatment plan for specific period during the National Day (60 days from 1 September to 31 October), prepared and arranged emergency shift duty for specific period, and further improved the daily management working mechanism of the emergency response system to ensure timely and effective emergency response.

PART IV CARE FOR STAFF

I. OUR STAFF

Employee team is the most valuable asset of the Company and the foundation for corporate development. The Company will employ staff in strict compliance with the laws and will never harm their interests. By closely monitoring the interest of the staff and creating a good environment, the Company contributes to self-achievements and well development of the staff.

As of 31 December 2019, the Company has executed labor contracts with 8,187 employees in total

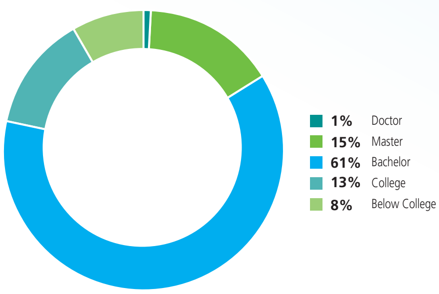
1. Employment Diversity

1.1 Current Employment Overview

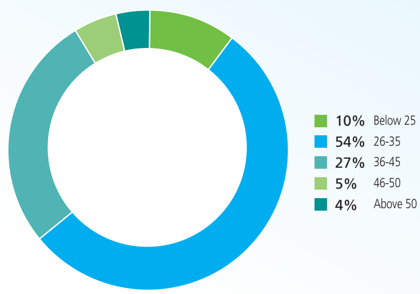
The Company continues to strengthen the optimization and management of human resources and strives to establish a dynamic and competent team with high academic qualifications, young age, advanced techniques and strong professional skills. Currently, the Company has recruited a number of talents possessing core expertise, high-end technique as well as operation and management skills of the industry, which lays a solid foundation for the Company's sustainable development.

The Company has a relatively stable workforce. Over the last three years, the employee turnover rate was maintained at below 5%, and was only 2.29% in 2019.

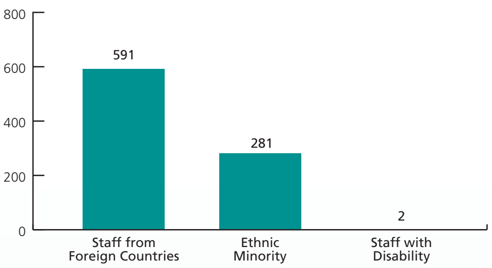
Breakdown of Education Level



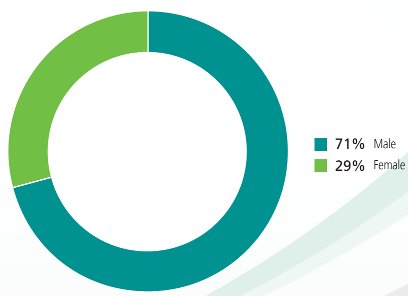
Age Composition



Number of Staff from Foreign Countries, Ethnic Minority or with Disability



Gender Composition



1.2 Staff Recruitment

The Company maintained a sound staff recruitment process in accordance with the requirements under the Labor Law, the Employment Contract Law, the Law on the Protection of Minors, the Law on Protection of Rights and Interests of Women and the relevant laws and regulations, and strictly carried out reviews on the basic information of job applicants. The Company forbade the employment of child labour and forced labour, and adhered to the principle of equality between men and women. The Company does not discriminate against staff on nationality, race, age, gender and marital status.

The Company has established various recruitment channels based on different needs of talents for various positions, including internal recommendation, internal recruitment, open recruitment and campus recruitment. It also introduced innovative measures to conduct recruitment of talents in various aspects such as railway signaling, rail transport digitalization and intelligence, maglev, electric motor system for passenger trains, deep water equipment and semi-conductor and overseas talents, which will provide the Company with talents supporting its major industrial development.

Internal recommendation	Internal recruitment	Open recruitment	Campus recruitment
• Establish an internal recommendation platform with regular improvement	• Adhere to the principle of "publishing internal recruitment notice" every month • 98 employees were transferred internally during the year	• Satisfy the demands of employers for open recruitment through various channels • 218 people were employed through open recruitment during the year	• Implement section-based project manager system under unified principle • 284 people were recruited from colleges and universities during the year

2. Staff Salary and Benefits

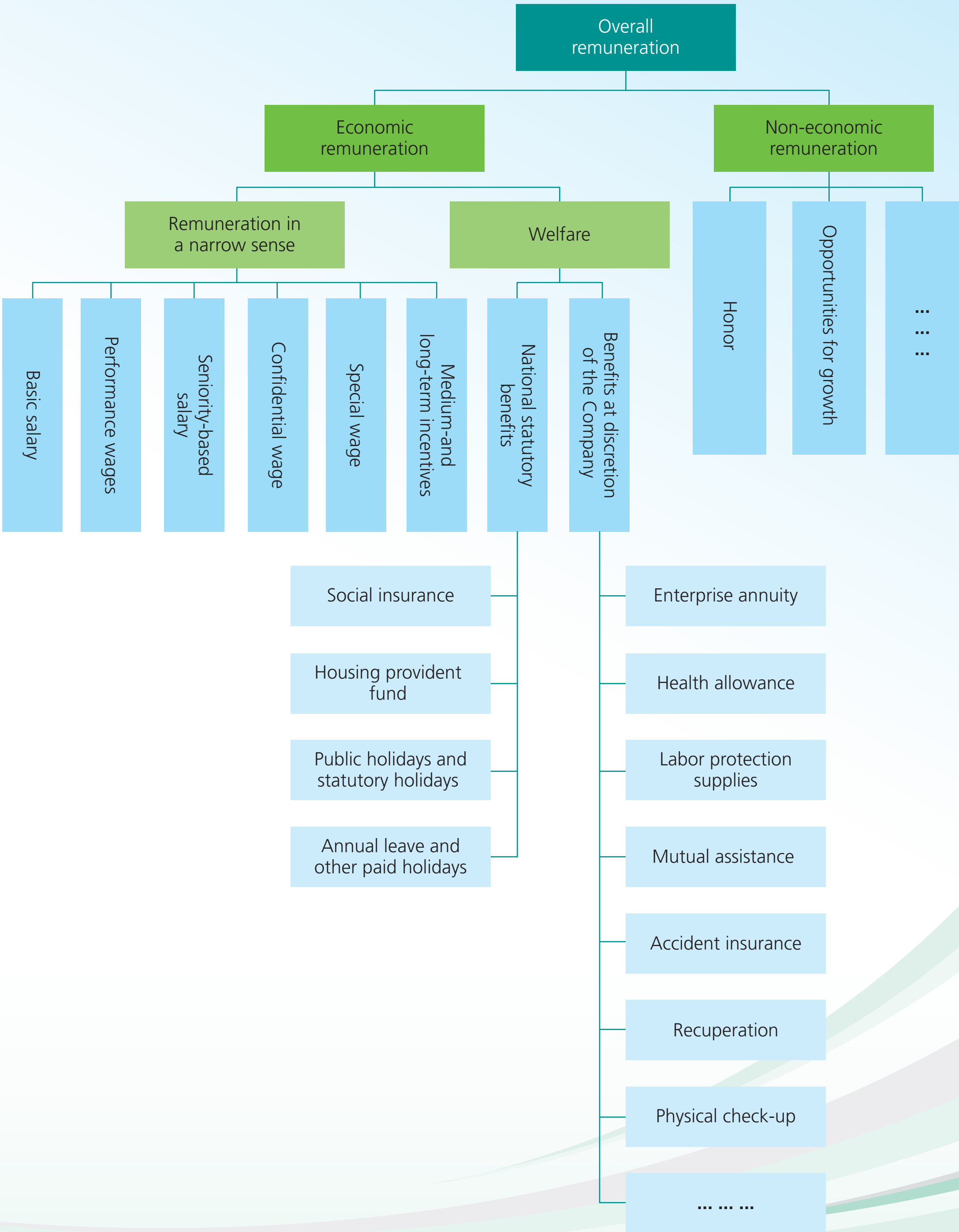
The Company provides remuneration and benefits in accordance with the requirements under national laws and regulations and relevant policies, maintains a comprehensive remuneration and welfare management system, and adheres to the principle of equal pay for equal work and legal remuneration.

The Company adheres to the principle that puts efficiency as top priority while giving consideration to fairness and equality, and establishes a salary system which integrates salary with position, capability and performance.

In accordance with the requirements of national laws, regulations and related policies, the Company provides and maintains statutory benefits for its staff, including basic pension insurance, basic medical insurance (including medical insurance for serious illnesses), work injury insurance, maternity insurance, unemployment insurance and housing provident fund, etc. It also provides the staff with various benefits at the discretion of the Company, including corporate annuities, supplemental medical insurance, lunch subsidies, health allowance, labour protection supplies, physical check-up, recuperation, transportation and communication subsidies, mutual assistance, accident insurance for family planning, etc.

Staff is entitled to day-off on public holidays, wedding leave, funeral leave and maternity leave. In addition, they are entitled to annual leave according to national Regulations on Paid Annual Leave and Implementation Measures for Paid Annual Leave for Corporate Employees.

The Company promotes the concept of overall remuneration. It has extended the concept of remuneration to include welfare and other non-economic rewards such as honours, career development, etc. Accordingly, the staff can have a comprehensive understanding of the returns given by the Company, which enhances the incentive provided to them in the form of remuneration.



II. TRAINING AND DEVELOPMENT

1. Staff Training and Management

Accurate Identification of Demand

Comprehensive survey and study on training demand conducted by the Company at the beginning of the year

Scientific Plan Formulation

Training plan formulation on the basis of the data from the training demand survey

Various Forms of Training

Internal training, external training and outsourced training; internal and external lecturers

Based on the extensive training demand survey and study alongside with the analysis on various training needs of strategic development and department operations and employee's career development, the Human Resources Department of the Company actively allocates its resources and arranges training at different levels, in different forms and on different aspects by engaging internal and external lecturers.

The Human Resources Department persists in revising and updating training management and system development, and eliminating obsolete ones by enlarging efforts on monitoring and best practice benchmarking to ensure implementation of training projects at organizational level. Moreover, the Company encourages independent design based on three levels of learning, namely position, competence and career development and integrates resources of internal and external programs in order to help enhance motivation, ability and perseverance of its staff in learning, and rendering the staff training more targeted and directional.

In order to uphold the requirements of the Company's strategic human resource management, realize the common development of employees and organizations, and at the same time standardize and coordinate the training management within the Company, the Company optimized the training system based on the operation mode of the training centre in 2019. At the same time, the Company began to build its training brand and established the brand image of the training centre among employees, customers and external companies.

Talents are the core competitiveness of the Company and play a critical role in corporate development. The Company values the cultivation of talents and development of talent team. Based on the position and development strategy the Company, we organized and carried out the training for talent pool, training for core frontline staff, profiling and training for ideal positions based on business scenarios, training for international talents and other training activities. By providing different trainings with different tutors, we developed various core talent teams comprising talent reserves, international talents, marketing talents and internal trainers.

In 2019, the Company's total investment in training was approximately RMB10.73 million. The training time per capita was 45 hours, 8,000 person-times received relevant trainings, and 2,026 training projects were completed. The implementation rate of the Company's annual training plan was 93.52%.

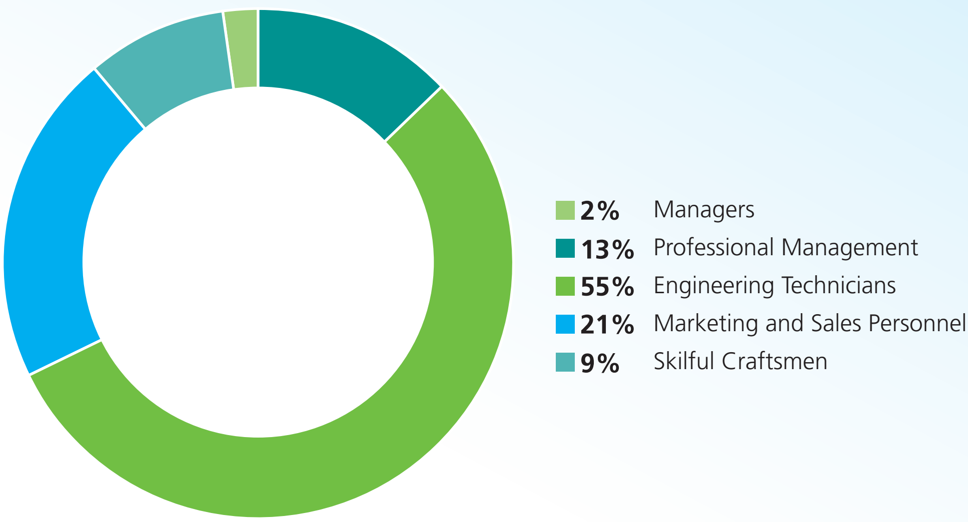
2. Staff's Career Development

The Company has developed a "bridge" shape career development system with 5 career development paths for managers, engineering technicians, professional management, marketing and sales personnel and skilful craftsmen. Every staff may realize his/her own career development through the planned career path of the job he/she engages. Currently, staff above C-level accounted for 41.96% of total number of staff.

Currently, the Company has a team of experts possessing core expertise of the industry, operation and management talents as well as core technological talents. The team includes 2 "scientists", 6 "chief technological experts", 29 "senior technological experts", 149 "technological experts", 1 "chief management expert", 5 "senior management experts", 35 "management experts", 1 "senior skilful expert" and 17 "skilful experts" of CRRC.

Composition of career development paths:

Composition of Total Remuneration



Note: The scope of statistics does not include DYNEX and SMD.

III. HEALTH AND SAFETY

1. Safety Objective and Target Management

The Company adheres to the occupational health and safety policy of "people-oriented, continuous improvement, environmental protection, health and safety".

In 2019, the Company did not experience any accidents involving deaths, serious and minor injuries, as well as new cases of occupational disease. There were also no Class I fire and explosion accidents, material and liable traffic accidents, and other accidents with material effects. The situation of safe production was generally good. The Company did not violate relevant laws and regulations in relation to provision of a safe working environment and the protection of employees from occupational hazards.

2. Overall planning and comprehensive layout for performance of production safety responsibility

The Company has released the implementation plan of the annual safety focus, annual safety inspection plan and overall planning of the year's safety work, and has clarified the objectives, evaluation criteria, responsible subjects and schedules for annual safety work, working out an early plan and layout for the Company's safe production.

The Company has implemented safety production responsibility at all levels. The general manager, party committee secretary and each business division (department) of the Company signed the "2019 Safety Management Objective Responsibility Letter", and clarified the annual safety assessment indicators and key work assessment indicators for each division. The professional managers of each division have paid a security risk deposit of RMB900,000 to the Company.

The Company pays attention to safety investment. In 2019, the Company has actually invested over RMB30 million for the labour protection fee and safety production cost, which are used for employees' labour protection and safety hazard rectification. The actual safety production cost withdrawn was in compliance with the requirements of relevant national laws and regulations.

The Company regularly organizes quarterly safety committee meetings to summarize the current safety production work, arrange the next stage of work, and study and solve problems in such work.

The overall work planning, the signing of the safety objective responsibility letter, the implementation of the safety risk deposit system, the safety investment and the safety committee meeting mechanism have formed a situation of "joint responsibility between party and government, one position bearing two kinds of responsibility, and joint control and management among various departments", laying a solid foundation for the Company's 2019 annual safety management objectives and indicators.

3. Conducting EHS system optimization to continuously improve environment and occupational health and safety management system

The Company updated the sources of risks and environmental factors in a timely manner and ensured that they were under control. In 2019, the Company identified 50 major sources of risks and 26 important environmental factors, and further improved the controlling measures through engineering, warning, training, management, labour protection and emergency response to strengthen risk management and control.

The Company regulated hazardous waste, carried out special tasks for hazardous waste disposal, formulated special rectification plan for hazardous waste, categorized the hazardous waste of each unit, prepared the list of hazardous waste of the Company, standardized the notice boards and safety warning signs of hazardous waste premises, and ensured that the hazardous waste storage places, packaging bags and containers were properly labelled with signs of hazardous waste.

In 2019, the Company obtained the latest national Environment, Health and Safety ("EHS") laws and regulations through government websites, "Eagle Eye" law platform and other channels. In 2019, a total of 6 new laws and regulations, 11 new standards, 14 updated laws and regulations and 1 updated standard were obtained. Through monthly safety meetings and quarterly safety committees, the Company conducted publicity on newly obtained laws and regulations and carried out compliance evaluations to ensure that the Company's production operations comply with relevant national laws and regulations.

Through various approaches such as "Going out and Bringing in", the Company has further strengthened various safety and environmental education and training work, organized various forms of education and training activities to improve staff safety, with over 13,000 person-times of safety trainings at all levels in 2019.

The Company and each unit organized various safety inspections and handled security risks according to the "Five Implementations" principles, namely the implementation of rectification measures, provision of rectification funds, designation of person in charge for rectification, setting of time limit for rectification and implementation of emergency plans. 3,263 security risks were discovered in inspections at all levels, among which 3,230 were rectified, representing a rectification rate of 99.0%.

The Company regularly conducts occupational health checks for employees engaged in positions involving occupational hazards before, during and after their tenure to keep abreast of the health condition of employees and avoid occupational accidents.

The Company engaged the occupational disease prevention and control centre to conduct on-site monitoring of occupational hazards. The number of detection sites was 89, and the number of sites meeting the standard was 84, representing a compliance rate of 94.38%.

IV. INTERESTS OF STAFF

1. Implementing system of Workers' Congress to safeguard employees' interests

As the basic form of practicing democratic management by enterprises, the Workers' Congress is an organization body for workers to exercise the power of democratic management in accordance with the provisions of laws. Based on the principle of democratic centralism, the Company established its Workers' Congress system in accordance with relevant requirements under the Trade Union Law.

The Council of Labour Union is the operating authority of the Workers' Congress and is responsible for the daily work of the Workers' Congress. It has 147 existing staff representatives elected democratically from cadres (staff) in various departments (units), involving personnel from various fields of the Company, such as management, technology, production and marketing. The Workers' Congress system has strengthened the Company's democratic management effectively, guaranteed the rights of staff to exercise democratic management according to the law, fully utilized staff's motivation and creativity, and therefore effectively enhanced our enterprise quality and economic benefits.

Nearly 100 opinions and suggestions were received at the 2019 Workers' Congress. After collection and processing, they mainly involved issues such as labour management, cost reduction and efficiency increase, livelihood measures, talent flow and cultivation, and industrial development.

The Company organized employee representatives to provide opinions and feedback on 6 administrative documents including "Manager Annual Salary System Management Measures", and collected a total of over 40 pieces of opinions. For suggestion on performance-based annual salary, over-fulfillment profit incentive and meal allowance standard proposed by frontline staff, the Company actively communicated and coordinated with the human resources department and administrative security department to solve such problems.



2. Maintaining mechanism for communication between senior management and frontline staff and difficulty assistance mechanism, and establishing mechanism to create harmonious labour relationship

(1) In order to continuously increase corporate competitiveness and establish a harmonious labour relationship, the Company actively expanded the democratic channel with the views to motivate staff's incentives and creativity as well as effectively exploit potential resources. In 2019, the Company accepted 1,058 reasonable proposals from its staff. The adoption rate of reasonable proposals from its staff was 100%.

(2) The Company set up contact sites for public opinions to serve fundamental staff, with branch presidents as the liaison officers of the units for public opinions. The Company also established fundamental labour union that covered all systems of the Company with targeted communication and liaison stations for the fundamental staff and other employees, so as to gain an in-depth understanding of the staff's concerns and requests.

(3) The Company implemented a point-based award management system by establishing a point-based award platform, where fundamental staff are awarded for reasonable suggestions, so as to encourage them to actively participate in management innovation and improvement of production quality of the Company. In 2019, the Company received a total of 4,328 improvement proposals.

(4) In 2019, the Company further promoted the contact point system of the management members, who carried out the management work along with integration of required content and optional content, with an aim to understand the situation, provide guidance and solution at the lower level. Throughout the year, the Company carried out 38 cadre/employee symposiums and 13 functional department exchange meetings and participated in various forms of team activities for more than 30 times, and truly went deep into the front line. The Company also summarized and replied to more than 100 opinions and suggestions on various aspects including the Company's development, compensation and benefits, personnel training, logistics support, and employee care.

3. Formulating "Four Major Measures" and creating a "Warm Labour Union" to provide care for employees

(1) Creating a "Caring Home": The Company provided targeted support based on "Six Donations and Three Focuses" in order to care and support employees and solve their problems in a practical manner.

For in-kind assistance, the Company carried out two caring activities and donated RMB178,000 to 89 employees in difficulties. Rice, edible oil, flour and other gifts of Chinese New Year worth of over RMB1.70 million were given to over 5,700 members of the labour union. The Company provided student grants of RMB68,000 to support 22 students, among which 2 students received support from the "Academician Fund". The Company also arranged body check and gynecological examination for 423 staff aged 45 or above and 1,181 married female staff on the basis of "regular items + optional items". The Company provided "Six Donations and Three Focuses" solatium of RMB1.16 million. 127 new members in 15 batches were approved to become members of mutual aid and mutual support. The Company sent birthday wishes and gave birthday gifts worth of RMB1.089 million to 5,442 employees.

For psychological assistance, the Company organized the "Micro Classes" club to give three sessions of parenting education under the theme of "Enjoying Happy Relationship with Your Heart", and arranged over 300 employees to participate in the relevant courses such as "How to know your children better" and "Emotion management" in order to strengthen the employees' parenting skills and improve their family relationship and happiness.



(2) Creating the "Home for Female Staff": Through seven clubs of the Weekend Girls' School, the Company continued to carry out Girls' School activities to enrich the staff's life after work and improve the personal attributes of female staff, thereby facilitating the staff to fulfill their pursuit of a better life. In particular:

The Company organized the female staff to make handicraft works to celebrate the anniversary of CRRC ZELRI and display such handicraft works on the International Women's Day. 12 cloisonne paintings were made to celebrate the anniversary of CRRC ZELRI and displayed at the handicraft works exhibition of the institute. The Company also organized the dance club to teach various types of dance to the female staff with a view to enriching their life after work and improving their personal attributes. Female staff were also given a platform to show their talent by performing at the opening ceremony of the International Women's Day Sport Games and the National Day trail walking activity. In the fifth "CRRC Zhuzhou Book Reading" activity, the staff submitted 18 essays and 11 letters, performed reading of 7 articles, and made 10 calligraphy works and paintings and 23 photographic works. The Company held the "Growing with the Era" skill and talent show and carried out female staff reading activity, which received 37 reading reports. In the activity of "Establishing New Standards based on Traditional Family Rules and Disciplines", the Company collected a total of 47 stories and 11 short videos related to traditional family rules and disciplines. The "Joyful Mind and Joyful Acts" reading club held two sessions of writing activities and masterpiece reading activities related to Mid-Autumn Festival and National Day, which enhanced the literary appreciation skills of the staff, promoted patriotism and helped the staff better understand the "Home Country Feelings" proposed by President Xi Jinping.

The Company carried out the staff clubs open month activity under the theme of "Jointly creating a better community and enjoying a better life". The elite members of the staff clubs made contribution by leading over 100 staff and their children to participate in staff clubs training activities. Various types of activities including family badminton class, family yoga class and staff dancing class were provided to the staff from Monday to Sunday.

PART IV CARE FOR STAFF





The Company held the CRRC Times Electric "Lotus Cup" Outstanding Staff Commendation Meeting under the theme of "Forging Ahead in the New Era with 60 Years of Outstanding Performance" and themed salon of female staff clubs. This event encompassed commendation of female staff of CRRC Times Electric, female staff encouragement salon, opening of Weekend Girls' School, celebration of the 60th anniversary of CRRC ZELRI by the female staff and other fun and energetic activities.

(3) Creating a "Healthy Home": The Company broadened the staff's mind and enriched their life after work and created a "warm and caring living space" through various amateur sports clubs.

The Company established the two-level leisure activity management model. For CRRC Times Electric, the Company held common and popular sports activities and increased the forms of competition to include individual age group competitions, double, single and team-based matches, which attracted more sport lovers to participate in sports trainings and competitions and improve their physical health. It also put efforts in training for players with outstanding performance. At institutional and departmental level, the Company improved the competition intensity and visual attraction of the amateur sports activities, and won the champion for all competitions other than the basketball competition in which the Company won the second place. The Company also won the first place in four out of five games in the fun sports event.

The Company organized the trail walking activity to celebrate the anniversary of CRRC ZELRI. In particular, the Company held the opening ceremony including dancing, choir performance and literary reading, carried out promotional activities, organized 18 teams and 1,080 participants, set up five refreshment points and formulated and implemented plans for other activities related to trail walking. The Company also organized over 40 actors to rehearse for the musical and melodrama made for CRRC Times Electric and perform at the CRRC ZELRI anniversary gala which was attended by 1,100 staff and their family members.



(4) Creating "New Tiny Home": Under the "New Tiny Home" special activity, the Company organized the labour union of frontline staff to establish "New Tiny Homes" with different characteristics based on the actual situation in different areas, and turned the "New Tiny Homes" into organic vessel for "two builds, one develop". The Company formulated relevant assessment rules and four construction models, which were adopted by relevant departments and implemented throughout the institute. In particular:

- The Company organized the CRRC South Africa company and South Africa after-sales service office to jointly apply for setting up overseas outpost of "Staff Home";

- The Company organized ZNERCC to communicate with the labour union of Shenhua Zhunneng, and organized the technology centre and semi-conductor business division to share experience and prepare for the establishment of expert workshop and skill workshop;

- The Company arranged Xinxing Ductile Iron Pipes Co., Ltd. to visit the Company and exchange information, achieved democratic management of labour union, carried out economic and technological activities such as labour skills competition, innovation and efficiency enhancement, thereby performing its role as an industry leader; carried out information exchange and trainings in relation to employee care, enhancement of happiness and sense of belonging, construction of Staff Home and other matters related to labour union.

PART V SOCIAL HARMONY

I. SUPPLY CHAIN MANAGEMENT

1. Commercial Rules for Procurement

(1) Resolving "meeting the direction of the Company's future development" as the guideline for selecting suppliers.

To achieve the target of "reliable performance, optimal cost and flexible supply", CRRC Times Electric implemented supply chain management with focus on ability enhancement, and maintained a high-quality, low cost and agile supply chain to support the Company's diverse strategic development. The Company developed new relationship with 54 manufacturers, 10 agents, 4 packaging suppliers and 4 transportation service providers, rendering the supply chain the core competitiveness of the Company.

(2) Signing annual performance agreements with key suppliers, monitoring key performance and arranging specialized improvement and support.

In 2019, the Company entered into annual performance agreement with key suppliers, arranged planning, procurement, quality and category management personnel to conduct assessment on such suppliers, identified bottleneck points, made relevant targeted assistance and upgrade plans and benchmarked and summarized the results, which significantly enhanced the performance of suppliers.

(3) Conducting regular business exchanges with key strategic suppliers quarterly to promote the improvement of both parties.

The Company held quarterly meetings with key strategic suppliers in order to effectively guarantee the supply of imported electronic raw materials.

(4) Dispatching quality engineers and quality inspectors for on-site supervision of companies with frequent quality problems to improve the level of quality management of suppliers.

In 2019, the Company provided support to 4 suppliers in respect of quality management for a total of over 90 man-days, including the support from material technology, technique and quality engineers and inspectors. Based on the quality of suppliers, the Company made targeted plans to provide support in various aspects including secondary supplier management, quality management, warehouse management, technique improvement, skill improvement and on-site management. With our support, the quality of suppliers was significantly improved.

In addition, the Company conducted special supervision on one supplier. Through our improvement measures, the absolute number of quality issues of the supplier decreased month by month, and no critical risk was recorded after supervision. The internal quality management and control of such supplier was effectively improved, particularly, the abilities in material management and control (including supplier management and warehouse management), technique execution and equipment management control were greatly enhanced, which reflected remarkable result of supervision.

(5) Promoting e-procurement information platform and order collaboration with suppliers to improve information exchange with them and reduce transaction costs.

CRRC Times Electric has implemented SRM system order coordination for over 500 suppliers since 2018, which enables information management for the whole process from procurement order placing, coordination, delivery to billing, thereby greatly enhancing working efficiency of both parties, effectively decreasing communication costs, reducing waste of resources in the supply chain and decreasing transaction costs.

(6) Conducting exchanges with suppliers to improve supply chain management and control and drive down the costs of supplies.

The Company discussed with certain quality enterprises in respect of the DC600V passenger train power supply unit project and carried out channel optimization for key raw materials, which effectively reduced the procurement cost and supply cost of its key raw materials.

2. Assistance and Support to Suppliers

Taking the Company's development strategy as the development orientation, the strategic layout of the Company's key business segments has corresponded to the external supply chain resource management, focusing on the improvement of the manufacturing capabilities of the external suppliers. With the QCD indicator as the traction, we have set up project teams and adopted planned support management through training, exchanges, seminars, reports, and management forums. The Company has fully helped suppliers understand the needs and communicated with them to form a mutually beneficial and win-win ecosystem. The Company has the following ideas in respect of support and assistance.

2.1 On-site Management

The 5S basic management is the premise to promote the improvement of the Company's QCD indicators, and is the cornerstone of lean management. The Company started from the 5S site basic management, through fixation management, normalized 5S activities, inspection and rectification, to help suppliers strengthen daily management, so that the site logistics and information flow are smooth, and the production is in an orderly manner. The Company has gradually realized visual and trace management to improve quality, efficiency and inventory.

2.2 Quality Management

The Company is problem-oriented and has learnt to carry out bottom-up quality analyses, and has identified customer needs through the hierarchical management of problems, conducted introspection and analysis, and gone in to the source of the matter and solved the problem at root, thus improving the overall quality level. Through the introduction of tools and methods such as the "Misplaced Parts Activity", quality case analysis, and special improvement of TOP4 issues, the product process quality control ability has been improved; at the same time, the Company organized ability training for quality control personnel, improved the inspection standard, and enhanced the quality and ability of quality control personnel.

2.3 Plan Management and Control

In the future, demand will drive the front-end production management plan. The Company will implement the introduction of the "three-three-three" rolling production plan from the four aspects of production planning, material planning management and optimization, management and control improvement under the planning schedule, and ERP production management module, and establish a monthly inventory management mechanism for production; establish the material preparation mechanism and safety stock mechanism; continue to improve the production planning evaluation system, optimize the control under the plan, and sort out the establishment of a management mechanism for the lack of materials; and increase the on-time completion rate of the production plan and ultimately achieve the production plan on time.

2.4 Lean Operation

Combined with the actual production situation of the suppliers, the Company starts with the production plan and abnormal management, introduces the hierarchical meeting model, uses production needs to stimulate the upstream and downstream interface relationship departments and functional departments, simplify the inter-departmental cooperation process to form standardized information communication channels and methods and achieve the fast response and resolution of exceptions, ultimately satisfying the customer delivery demand.

3. Local Purchase to Promote Local Development

CRRC Times Electric has summed up and piloted a set of scientific, rigorous and perfect quality management and control programs, and trained more than 320 welders of EN15085 international welding certification for local enterprises. The strict job skill admission system has provided a typical example for the quality assurance of key components of high-speed rail, motor trains, subways and locomotives, and achieved a steady improvement in the quality of rail transit products, and also promoted the overall capacity improvement of the entire rail transit component industry chain. Through the continued support and guidance of the Company, the number of strategic suppliers in the region has increased from 4 to 8; and the total output value of strategic suppliers in the region has increased from RMB350 million in 2011 to RMB700 million in 2019. At the same time, the number of persons employed by strategic suppliers has increased from more than 1,300 in 2011 to more than 4,100 in 2019. In 2011, the Changsha-Zhuzhou-Xiangtan area had no obvious regional advantages in the domestic high-end panel cabinet manufacturing industry. As of 2019, some outstanding suppliers have become the "leaders" in the production of high-end electric panel cabinets for rail transit, reaching the world's leading level. Based on the proportion of total purchase amount, Zhuzhou City's suppliers accounted for 82.5%, and the Changsha-Zhuzhou-Xiangtan Economic Zone accounted for 91.5%, which has promoted the employment of suppliers and increased production capacity. Such social contribution has driven the development of the local economy.

II. PUBLIC CHARITY

In 2019, the Company actively launched different kinds of activities under the themes of social responsibility and dedication, including social assistance, student support and environmental practice, in order to contribute to the society with gratitude and actively assume the Company's social responsibility.

1. Continuously establishing the "Dandelion" education supporting platform for a variety of education subsidies

The Company relied on the Yuexing Volunteer Association to establish the charitable "Dandelion" platform for education sponsorship. Through the launch of the three series of activities this year, the Company provided targeted support to a total of 11 impoverished students, carried out caring activities in the form of regular sponsorship, and encouraged all staff of the Company to make donation. Over 600 benefactors participated in the event throughout the year, raising funds of RMB23,600.55 and a large number of donations in kind. The Company guided its employees to practice the core values of "walking the righteous path with the righteous mind and doing good deeds with good intention", and gathered young positive energy and established a good corporate image.



2. Carrying out the tree planting activity of "Protecting lucid waters and lush mountains with 60 years of efforts"

Yuexing Volunteer Association under the Company's League Committee organized the tree planting activity of "Protecting lucid waters and lush mountains with 60 years of efforts", which encouraged the Company's employees to plant the greenery with their own hands and put the concept of "lucid waters and lush mountains are invaluable assets" into practice. Over 600 employees and their family members from the entities and units in Zhuzhou participated in this activity. This tree planting activity enhanced the awareness of environmental protection of the Company's employees, and strengthened their sense of ownership in the course of building a better Zhuzhou and sense of responsibility of creating a green environment.

3. "Supporting the Party by Making contribution in the New Era" trail walking activity along Xiang River to commemorate the 100th anniversary of the May Fourth Movement

The trail waking activity along Xiang River was a large charitable and environmental protection activity initiated, organized and operated by the Volunteer Association of Zhuzhou Evening News, and all the funds raised from the activity were used to support education and environmental protection and help the impoverished students improve their education and living conditions. As an important participant of this activity, the Company organized its employees to participate in the "Supporting the Party by Making contribution in the New Era" charitable trail walking activity along Xiang River on 1 May. Over 180 employees formed different groups or participated with their family members in this large-scale, long-distance and charitable trail walking activity initiated by Zhuzhou City.

4. Carrying out public welfare activities

In order to promote the traditional Chinese virtue of respecting the elderly and caring for the young, improve the morality of young employees of the Company and strengthen the awareness of caring for orphans and disabled children, youth volunteers of the Company visited the Zhuzhou Children's Home, gave daily necessities, toys, milk and other gifts to the children living there, and gained a detailed understanding of the children's living conditions in terms of clothing, food, housing and transportation in order to provide love and care to orphans and disabled children.

The Company carried out the "Together We Help the Impoverished and Needy" online e-commerce poverty alleviation activity. To respond to the government's call for action, the Company focused on hot topics in the society and developed sales channel for the impoverished farmers through e-commerce to help them out of poverty. The Company collected information of impoverished farmers from official sources, and promoted the activity through various forms including e-mail, labour union study, poster and display board. A total of 154 employees participated in the activity which generated income of RMB12,460 for the impoverished county.

In order to create a better reading environment for the citizens in Zhuzhou, the Company cooperated with Yundong Bookstore of Shenlong Theatre to carry out the bookstore improvement volunteer activity of "Organizing Books with Love to Create an Environment of Warmth and Care". The volunteer activity included donating books and tidying and cleaning the bookstore, thereby contributing our youth strength to this charitable bookstore in Zhuzhou and shaping a bright cultural landscape.

In order to improve the nutritional intake of children in impoverished areas, the China Foundation for Poverty Alleviation initiated the "Sharing Love with Food Support" project to improve the nutritional intake of children in impoverished areas by providing nutritional meals and education on balanced and nutritional diet. To promote this public welfare activity, the Company carried out the donation activity of "Sharing Love by Finishing Your Plate", which became a hot topic in the social media of the employees and attracted numerous likes and comments with 101 participants.

Ningbo CRRC Times Transducer Technology Co., Ltd. cooperated with Yongjiang Community to carry out the activity of "Providing Warmth and Care to Yongjiang through Blood Donation", which received great support from the Company's employees and kindhearted citizens in the community. Nearly 90 employees participated in the blood donation activity, in which 69 people donated a total of 20,250 milliliters of blood.

With the intention of caring for employees' health and supporting impoverished students, the Company carried out education supporting donation activity of "Caring Your Health and Supporting the Dream of Others". The donation was made on a voluntary basis with a minimum donation amount of RMB1. The Company called on its employees to make donation to support impoverished students, and gave each of the contributing employees a dandelion bookmark as a gift for their kindness. A total of over 300 employees participated in the donation, and the funds raised will be invested in the CRRC Times Electric "Dandelion" education supporting platform to be used as education subsidies in the future.

In order to promote the love and philanthropic spirit of all employees, put the Company's idea of reciprocating the society into practice, and in response to the call from the Jintai District Committee of the Communist Youth League, the general branch of Youth League of Baoji CRRC Times Engineering Machinery Co., Ltd. carried out donation activity and raised RMB11,783.5 to purchase heat packs. These heat packs were given to impoverished and left-behind children in Qianyang County, Linyou County, Long County and Fengxiang County in Baoji.



PART VI FUTURE OUTLOOK

In 2020, we will focus on "Three Core Businesses, Five Incremental Industries, One Strategy and Two Markets", strive to expand the market, and capture development opportunities, thereby making breakthrough in terms of operation scale and efficiency.

1. Focus on innovation of key technology and facilitate key technology breakthrough. The Company will increase its efforts in the development of fundamental capabilities, upgrade the resources and abilities in technological research and testing, and establish an intelligent and integrative "big system".

2. Strengthen strategic guidance and plan implementation. The Company will develop its core business in railway, urban rail and railway engineering industries to consolidate its industry position; make breakthrough in incremental industries including signal and communication, semi-conductor, industrial converter, electric motor system for passenger vehicles and sensor to capture development opportunities; and develop marine engineering equipment business, make breakthrough in key overseas markets, and expand in maintenance service market, thereby capturing market demand and creating growth drivers.

3. Accelerate reform and create new development momentum in the value chain. The Company will release its capacity, enhance the input-output ratio of the capital chain, put forward innovative ideas of capital operation and stimulate human resources efficiency. It will also enhance the operation efficiency, facilitate flexible supply chain management, improve the management of external suppliers and strengthen internal lean operation.

4. Optimize the quantitative and precise management system and increase the "depth", "breadth" and "compatibility" of refined management. The Company will strengthen organizational protection of corporate governance, continuously improve corporate governance and focus on prevention and control of major risks.

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		B3.2 The average training hours completed per employee by gender and employee category	P58-59
	B4 Labor Standards	General disclosure: relating to preventing child and forced labour: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer	P56
		B4.1 Description of measures to review employment practices to avoid child and forced labour	P56
		B4.2 Description of steps taken to eliminate such practices when discovered	P56

PART VII APPENDIX

Environmental, Social and Governance Reporting Guide			Subject Areas
Social	**Operating Practices**		
	B5 Supply Chain Management	General disclosure: Policies on managing environmental and social risks of the supply chain	P67-69
		B5.1 Number of suppliers by geographical region	P69
		B5.2 Description of practices relating to engaging suppliers, number of suppliers where the practices are being implemented, how they are implemented and monitored	P67-69
	B6 Product Responsibility	General disclosure: relating to health and safety, advertising, labelling and privacy matters relating to products and services provided and methods of redress: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant influence on the issuer	P27-42
		B6.1 Percentage of total products sold or shipped subject to recalls for safety and health reasons	Not applicable
		B6.2 Number of products and service related complaints received and how they are dealt with	P39
		B6.3 Number of products and service related complaints received and how they are dealt with	P23-27
		B6.4 Description of quality assurance process and recall procedures	P27-42
		B6.5 Description of quality assurance process and recall procedures	Undisclosed
	B7 Anti-corruption	General disclosure: relating to bribery, extortion, fraud and money laundering: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant influence on the issuer	P15
		B7.1 Number of concluded legal cases regarding corrupt practices brought against the issuer or its employees during the reporting period and the outcomes of the cases	P15
		B7.2 Description of preventive measures and whistle-blowing procedures, how they are implemented and monitored	P15
	Community		
	B8 Community Investment	General disclosure: Policies on community engagement to understand the needs of the communities where the issuer operates and to ensure its activities take into consideration the communities' interests	P69-72
		B8.1 Focus areas of contribution (e.g. education, environmental concerns, labour needs, health, culture, sport)	P69-72
		B8.2 Focus areas of contribution (e.g. education, environmental concerns, labour needs, health, culture, sport)	P69-72

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